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A National Environmental/Energy Workforce Assessment. Kansas

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A National Environmental/Energy Workforce Assessment

KANSAS

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This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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TABLE OF CONTENTS

Page

ILLUSTRATIONS iii

ACKNOWLEDGEMENT vi

PREFACE viii

FOREWORD ix

STATE SUMMARY 1

STATE PROFILE 14

POLLUTION CONTROL AND ABATEMENT AGENCIES 16

POLLUTION CONTROL AND ABATEMENT PROGRAMS 23

- I. Air 24
- II. Noise 41
- III. Pesticides 49
- IV. Potable Water 61
- V. Radiation 77
- VI. Solid Waste 86
- VII. Wastewater 100
- VIII. Energy 120

SELECTED POST SECONDARY INSTITUTIONS WITH FORMAL ENVIRONMENTAL/ENERGY PROGRAMS 130

STATE LEGISLATION 138

APPENDIX. 155

NOTE: The Selected Bibliography is appended to each Regional Report.

ILLUSTRATIONS

Figure		Page
1	Kansas Department of Health and Environment, Division of Environment, Organizational Chart	22
2	Air Quality and Occupational Health, Organizational Chart	40
3	Kansas Department of Health and Environment, Division of Environment, Organizational Chart	76

Table		Page
I	Kansas State Department of Health and Environment, Bureau of Air Quality and Occupational Health, Current (1976) Staffing Level	30
II	Local Air Pollution Control Agencies, Current (1976) Staffing Level	31
III	Kansas State Department of Health and Environment, Bureau of Air Quality and Occupational Health, Workforce Projections to 1982 (est.)	35
IV	State of Kansas, Private Sector, Workforce Projections to 1982 (est.)	37
V	State of Kansas, Municipal Noise Ordinances (1975)	44
VI	Kansas Board of Agriculture, Current (1976) Staffing Level	52
VII	Participant-Commercial Applicator Training	58
VIII	Kansas Department of Health and Environment, Bureau of Water Supply, Current (1976) Staffing Level	62

Table Page

IX Kansas Department of Health and Environment, Office of Laboratories and Research, Water Microbiology Section, Current (1976) Staffing Level 64

X Kansas Department of Health and Environment, Office of Laboratories and Research, Water Chemistry Section, Current (1976) Staffing Level 64

XI Kansas Department of Health and Environment, Office of Laboratories and Research, Radiation Section, Current (1976) Staffing Level 65

XII Kansas Department of Health and Environment, Bureau of Water Supply, Workforce Projections to 1982 (est.) 69

XIII Kansas Department of Health and Environment, Office of Laboratories and Research, Water Microbiology Section, Workforce Projections to 1982 (est.) 70

XIV Kansas Department of Health and Environment, Office of Laboratories and Research, Water Chemistry Section, Workforce Projections to 1982 (est.) 70

XV Kansas Department of Health and Environment, Office of Laboratories and Research, Radiation Section, Workforce Projections to 1982 (est.) 71

XVI Kansas State Board of Health and Environment, Bureau of Radiation Control, Current (1976) Staffing Level 81

XVII Kansas Department of Health and Environment, Solid Waste Management Section, Current (1976) Staffing Level 90

XVIII Kansas Department of Health and Environment, Bureau of Water Quality (Headquarters), Current (1976) Staffing Level 104

Table		Page
XIX	Kansas Department of Health and Environment, Bureau of Water Quality, Water Pollution Control Section, Current (1976) Staffing Level	104
XX	Kansas Department of Health and Environment, Bureau of Water Quality, Water Quality Planning and Surveillance Section, Current (1976) Staffing Level	105
XXI	Kansas Department of Health and Environment, Bureau of Water Quality, Oil Field and Environmental Geology Section, Current (1976) Staffing Level	105
XXII	Kansas Department of Health and Environment, Bureau of Water Quality (Headquarters), Workforce Projections to 1982 (est.)	112

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PREFACE

This study provides information on existing workforce levels, training programs, career potentials and workforce projections (1976-82) for the environmental pollution control fields of air, noise, pesticides, potable water, radiation, solid waste, wastewater and energy conservation/conversion in the State of Kansas. The profiles and projections contained in this report were based upon available information obtained through various state agencies. The information and data presented in this study were obtained through extensive personal interviews with professionals working in the respective fields. The personal interviews were supplemented with information collected through telephone surveys and research.

This study was conducted under the direction of the United States Environmental Protection Agency by National Field Research Center, Inc., Iowa City, Iowa.

FOREWORD

The materials contained in this report include information and data collected for eight individual pollution control inventories conducted for Kansas. The format includes workforce profiles, projections and career potential for each of the areas investigated. Projections were necessarily based on best professional estimates obtained through available information. The pollution control areas considered by this study are as follows:

Air
Noise
Pesticides
Potable Water
Radiation
Solid Waste
Wastewater
Energy

National Environmental Energy Workforce Assessment

Phase I

KANSAS

State Summary

I. AIR

The Bureau of Air Quality and Occupational Health of the Kansas State Department of Health and Environment is the administrative office of all state air pollution control and abatement activities. The Bureau of Air Quality is currently staffed with 30 positions: 25 professional and 5 clerical positions. Of the thirty, 26 staff members are directly involved with air pollution control, and the remaining four are responsible for the Occupational Health Program. Of these 26 positions, 22 are professional and 4 are clerical. The professional positions include engineers, administrators, and non-degreed electronic and air pollution control technicians. The Bureau anticipates a 5% per annum growth in staffing during the next five years.

There are three local air pollution control agencies. These agencies are currently staffed with fifteen positions: 12 professional and 3 clerical. The professional category consists of five engineers and seven technicians. No growth is anticipated in the local agencies, and a decrease of two positions at the Kansas City agency is planned due to fiscal constraints.

Estimates indicate that in excess of 3,500 persons are involved in varied air pollution control activities in the state with approximately 1,000 engineers and 2,500 technicians. Rough estimates indicate that the private sector will grow by 5% per annum during the next five years.

II. NOISE

The Kansas State Department of Health and Environment and the Kansas State Department of Transportation are the two primary state agencies which operate environmental noise programs. Within the Department of Health and Environment, the Bureau of Air Quality and Occupational Health has been delegated community noise responsibility. The Bureau currently employs two persons whose activities focus upon OSHA related noise monitoring. Under this program, the Bureau has been providing technical assistance to municipalities in reviewing city codes, community surveys, and ordinance development. If the proposed noise legislation being submitted to the Legislature in 1977 is adopted, a community noise program will be developed and staffed with two engineers.

The Department of Transportation is currently staffed with six full-time environmental specialists: one engineer and five engineering technicians. No growth is predicted for the Department during the next five years. The Department administers a traffic noise control program.

Municipalities and private industries in Kansas have relatively underdeveloped industrial/environmental noise control and abatement programs. Limited information is available on the private sector workforce. Any growth in the private sector will be directly related to expanded state and municipal enforcement activities. However, private sector workforce requirements are predicted to remain constant.

III. PESTICIDES

The Kansas Board of Agriculture is the principal pesticide regulatory and control unit in the State. The Board has subcontracted the pesticide applicator training to the Kansas State University Extension Service. In addition to the program offered through the Board of Agriculture, the Department of Health and Environment operates a Pesticide and Vector Control Program.

The Board of Agriculture employs a total of 23 professionals in its pesticide programs: 7 entomologists, 3 chemists, 1 plant pathologist, 1 technician, and 11 others. The Board predicts only a slight increase in staffing during the next five years: two entomologists and three clerks.

The State Extension Service operates the pesticide applicator training through the assistance of a crew of 13 program staff members, 13 University instructors, and 100 county extension agents. As the program grows, the Service anticipates that its program staff will approximately double during the next five years.

The Pesticide and Vector Control Section of the Kansas Department of Health and Environment currently employs one sanitarian. During 1978, the Section proposed to add one position. The position would operate a Nuisance Bird Control Program.

Private sector workforce estimates include 360 commercial pesticide applicator firms with an average crew of 3.5 persons and 80,000 farmers who apply pesticides. The number of commercial applicators is expected to increase by 5-10% annually for the next five years.

IV. POTABLE WATER

The Bureau of Water Supply located in the Kansas Department of Health and Environment is the state lead agency for Kansas potable water programs. The Bureau's program operations consist of plan, specification, and permit application review, engineering field appraisals, post-construction inspections, collection of samples, and training of operators. The Bureau is currently staffed with six persons and receives part-time staff support through the six district Department of Health Offices. Their combined effort consists of 8 engineers and 2 engineering technicians. In addition to the support provided through the district offices, the Bureau receives laboratory services from the Office of Laboratories and Research. The Office provides the Bureau with an additional 9 person-years of effort annually. The Bureau is expected to grow by about 17% per annum during the next five years. This growth is related to the Safe Drinking Water Act Program. The amount of support provided by the Office of Laboratories is expected to increase to 16 person-years.

There are an estimated 2,300 persons employed in public water supply programs in the state. Growth in the public water supply workforce requirements are expected to be minimal within the next five years, with growth related to expanded program operations and extension of services to small communities.

V. RADIATION

The Bureau of Radiation Control located within the Kansas State Department of Health and Environment is the primary environmental radiation and radiological health administrative agency within the state. The Bureau is currently staffed with three full-time professionals, three technicians, and two clerical positions. Two of the professionals are health physicists, and one is an administrator. There has been no growth in the Bureau during the past two years. Nevertheless, during the next five years the Bureau expects to expand its staff by three positions: 1 health physicist, 1 radiation control inspector, and 1 radiation production specialist. Growth in the Bureau is a consequence of more complex X-ray equipment and non-ionizing radiation devices, the Safe Drinking Water Standards, the proposed Wolf Creek Nuclear Reactor Plant, and the Environmental Surveillance and Emergency Response Program.

Environmental workforce projections for the private sector are difficult to assess. Professional estimates indicate that universities, hospitals, and physicians/dentists account for a major proportion of the private sector radiation programs. In addition, there are approximately fifteen companies in the state that are involved with industrial well-logging. They employ an estimated two to three persons per industry. Increases within the private sector are expected to be slight during the next five years.

VI. SOLID WASTE

Kansas solid waste programs are managed through the Bureau of Environmental Sanitation of the Kansas State Board of Health and Environment. Two sections of the Bureau are involved with solid waste management: the Solid Wastes Management Section and the Recreational Sanitation Section.

The Solid Wastes Management Section is currently staffed with three professionals, three technicians, and one secretary. All the professionals have background and experience in sanitary engineering. The Solid Wastes Section will experience limited growth during the coming five years: by 1982, the Section will be staffed by six professionals and four technicians.

The Recreation Sanitation Section employs two professionals: 1 sanitary engineer and 1 sanitarian. Less than fifteen percent of the Section's time is allocated to solid waste related activities, e.g., 0.4 person years. Little change is expected in the number of person-years allocated to solid waste activities during the next five years.

There are 160 sanitary landfills in the state which are staffed with 286 persons: 180 equipment operators, 80 gate operators, 20 laborers, and 6 weighmasters. There are 296 collection systems which provide service to state residents; estimates indicate that 640 persons are employed in collection system occupations. There are no hazardous waste or resource recovery programs in the state. Five percent growth per annum is expected in the sanitary landfill and collection system workforce requirements during the next five years.

VII. WASTEWATER

The Bureau of Water Quality of the Kansas State Department of Health and Environment is responsible for wastewater regulatory programs. The Bureau is staffed with 76 professionals: 50 at state headquarters and 26 in district offices. The majority of the professionals have training as engineers, geologists, biologists, or engineering technicians. The Bureau estimates an 11% per annum growth, with the greatest increase in the engineering and engineering technician categories.

The Office of Laboratories and Research provides 2.2 person-years of laboratory assistance to the Bureau. The Office plans to expand its effort of commitment to 3 or 3.5 person-years per annum by 1981.

Several other agencies involved in the wastewater area are: Division of State Planning and Research, Kansas Water Resources Board, the State Conservation Commission and four regional planning commissions. A total of 30 additional persons are employed in wastewater activities through these agencies.

Private sector workforce estimates include 1,200 local treatment plant employees, 625 petroleum company employees, 300 persons working in commercial laboratories, and an undetermined number of employees in industrial wastewater treatment plants and local conservation district programs. Minimal growth is expected in the private sector during the next five years.

VIII. ENERGY

The Kansas State Energy Office administers a comprehensive energy planning program which emphasizes both conservation and research and development. Three of the state's universities, Wichita State University, Kansas State University, and Kansas University, have conducted approximately $1.9 million dollars worth of reasearch in energy related fields during the past year.

The Kansas State Energy Office is currently staffed with five full-time persons: one program director, two assistant directors, one fuel allocations specialist, and one secretary. The Energy Office does not predict any growth in staffing during the next five years; and, in addition, if state and federal funds are not continued at the same level, the office may experience some decrease in staffing.

No information is available on the number of persons employed in research efforts through the three state universities. Nevertheless, some growth is expected in the amount of research conducted in the energy field during the next five years.

The Attorney General's Office has one full-time attorney, who has designated responsibility for energy programs. The Office predicts that one or more new positions may be created during the next five years.

Private sector workforce statistics were not available; however, growth in programs is anticipated as the Wolf Creek Nuclear Power Plant is completed in 1983.

STATE OF KANSAS - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	3,534	3,709	3,890	4,073	4,286	4,500	5%
NOISE[1]	6	6	8	8	8	8	n/a
PESTICIDES[2]	49	51	61	66	71	76	n/a
POTABLE WATER[3]	19	24	28	31	37	38	n/a
RADIATION[4]	8	8	8	10	10	11	n/a
SOLID WASTE	1,033	1,049	1,062	1,078	1,129	1,146	2%
WASTEWATER[5]	108	120	132	143	147	151	7%
ENERGY[6]	11	11	11	12	12	13	n/a
TOTALS	4,768	4,978	5,120	5,148	5,699	5,930	4%

[1] The above does not include private sector projections.

[2] The figure includes only state agency and instructional personnel. Additional workforce projections include 100 county extension agents, the estimated 1,260 commercial applicators, and 80,000 farmers. The number of commercial applicators is expected to grow by 5-10% per annum.

[3] The above includes state effort in terms of person years. Private sector projections for the more than 2,300 public water supply programs have not been included.

[4] These figures include only the state workforce. Projections on the private sector are limited.

[5] The above includes projections for state and regional agencies only. It does not include the estimated 1,200 local treatment plant employees, the 625 petroleum company employees, the staff at the 360 industrial waste treatment plants, the local staff of the 105 conservation districts, or the 300 persons employed in commercial laboratories.

[6] The above includes state staff only.

EDUCATION

Environmental education programs are available only on a limited basis in Kansas. The University of Kansas located in Lawrence has a well developed Environmental Health Engineering program. Advanced degrees, M.S. and Ph.D., are offered through the program. An undergraduate degree, Bachelor of Arts, is also available in Environmental Studies. The Environmental Studies program is an interdisciplinary program. The undergraduate degree program was developed only recently, 1974; however, the advanced degree programs have been operational since 1961 and 1964 respectively.

Ottawa University of Ottawa, Kansas is in the process of developing three in-depth study programs with concentration in the environmental field: Interpretive Ecology, Research Ecology, and Environmental Resource Management. During the school year 1976-77, students were enrolled in the program for the first time.

Other than the two programs mentioned, environmental education programs are available only on a limited basis. Most colleges and universities in the state offer individual courses in ecology, man's environment, and environmental biology. However, little in the way of comprehensive environmental program majors is currently available.

LEGISLATION

The environmental/energy legislation for Kansas was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Quality Control Act
Agricultural Chemical (Economic Poison) Act
Kansas Pesticide Law
Public Water Supplies Law
Nuclear Energy Development and Radiation Control Act
Solid Waste Management Act
Certification of Operators Law
Water Supply and Sewage Law
Kansas Statutes Pertaining to Water Pollution Control

National Environmental Energy Workforce Assessment

Phase I

KANSAS

State Report

13

STATE PROFILE

Kansas, which lies amid the westward-rising landscapes of the Great Plains, was once looked upon as the agricultural heartland of the nation. Agriculture and manufacturing contribute significantly to Kansas' economy. However, after 1952, industry contributed more to the economy than the wheat farms and cattle ranches. The production of approximately 86,000 farms and ranches ranks Kansas first among the states in the production of wheat, second in sorghum grains, and fourth in wild hay. Kansas ranks fourth in its production of beef and eighth in hogs. Most western Kansas farms or ranches are large, ranging from one section of land upward. Eastern Kansas is populated with smaller farms, but these are growing in size. Kansas forbids other than family corporations for farming purposes.

Some 4,300 manufacturing and processing plants produce everything from airplanes to zinc castings. Locally, Wichita is known as the "Air Capital of the World" because it produces more small aircraft than any other city. Wichita is also the world's largest producer of camping gear, heating and air conditioning equipment, snowmobiles, and a variety of other products are manufactured along with the camping gear. Other plants in the state manufacture baby foods, pet foods, prefabricated houses, mobile homes, greeting cards, tires, paint, and dishwashers. Grain milling, though not as important as in the past, is still a major industry. The meat-packing and processing industry is growing.

Kansas has large mineral resources, a good labor force, an annual three billion dollar retail trade, ample electrical power, plenty of water, and a central location. Kansas is among the top fifteen mineral producing states; Kansas is rich in oil and gas, helium, portland cement, stone, clay and clay products, sand, salt, gravel, zinc, bituminous coal, and lead. There is an almost unlimited supply of chalk. Many plants produce gasoline, oil, grease, and paving materials from the oil pumped from Kansas wells.

Despite oil production, Kansas has never imposed a severance tax on oil or gas, and it has a tax rate on manufacturing plants that compares favorably with other states. Most Kansas cities issue revenue bonds to encourage new industry. The state has a right-to-work law that forbids compulsory unionism.

Kansas business and industry employs a civilian workforce of more than 800,000 persons; the unemployment rate varies from two to six percent. There is no minimum wage law other than the prevailing federal statute. In 1970, Kansas had a per capita personal income just below the national average and the highest of any state in the Plains region. The cost of living index as listed by the U.S. Department of Commerce in 1970 was just below the national average.

According to the 1970 census, Kansas had a population in excess of 2,200,000 persons. Approximately two-thirds of the population is localized in the eastern third of the state.

KANSAS POLLUTION CONTROL AND ABATEMENT AGENCIES

In Kansas, the principal pollution control and abatement agency is the Kansas Department of Health and Environment headquartered in Topeka. The Department of Health and Environment is divided into five program areas: Administrative Services, Division of Health, Office of Laboratories and Research, Division of Environment, and Planning and Education. The pollution control and abatement offices are, for the most part, located within the Division of Environment.

The Division of Environment is subdivided into six Bureaus: Bureau of Water Quality, Bureau of Water Supply, Bureau of Environmental Sanitation, Bureau of Radiation Control, Bureau of Air Quality and Occupation Health, and Bureau of Food Service and Lodging. (The services and staffing of the Bureau of Food Service and Lodging are not discussed in this report.)

In addition to the six Bureaus, the Environmental Laboratories, a division of the Office of Laboratories and Research, provides laboratory support services to the Bureau of Water Supply, the Bureau of Water Quality, the Bureau of Radiation Control and the Bureau of Air Quality.

The general functions of the Environmental Health Program include:

1) designing and enforcing policies for comprehensive environmental development and control on a statewide basis;

2) coordinating and implementing programs to provide for the most beneficial use of the state's resources;

3) stimulating public awareness of the need for environmental protection and conservation.

This study was designed to assess workforce profiles and projections for air, noise, pesticides, potable water, radiation, solid waste, wastewater, and energy conservation/conversion; however, the Kansas Department of Health does not strictly follow these categories in the organization of its Bureaus. The Bureau of Air Quality and Occupational Health and the Bureau of Environmental Sanitation have responsibilities in addition to those included under one of the above categories. Consequently, the staffing levels of the departments contained in this report reflect only those staff positions which are directly employed in one of the above categories.

The Division of Environment employs 158 persons with direct responsibility for environmental programs. The Office of Laboratories and Research has an additional 29 persons who are involved with environmental laboratory support programs. The combined staffing level of these programs are 187: 86 professionals, 65 technical, 13 administrative, and 23 clerical. Annual turnover rates for the categories are: 3% for professional, 7% for technical, and 20% for clerical. There is minimal turnover in the administrative category. (December, 1976.)

During the last fiscal year, the staffing of the environmental program has experienced a 10% growth with the greatest increase in the Bureau of Water Quality. This growth has been attributed to the legislative and regulatory impact of the Federal Water Pollution Control Act. The overall turnover rate for the program averaged 6%;

this low rate was ascribed to general satisfaction with working conditions, competitiveness of salaries with private sector, and general concern with the instability of the Kansas economy.

An organization chart for the Kansas Department of Health and Environment is included with this section to illustrate the interrelationship of the environmental programs to the other health programs.

A primary priority of the Kansas Department of Health during the next five years will be to coordinate, implement, and enforce the requirements of P.L. 92-500, the Federal Water Pollution Control Act Amendments and the Safe Drinking Water Act. This goal will impact a number of the programs; specifically, the Bureau of Water Quality, the Bureau of Water Supply, and the Environmental Laboratories. The staffing of these three programs will grow substantially over the next five years. The Bureau of Water Quality will increase its staff from 87 to 121. The growth will occur in the professional and technical categories; no growth is expected in either the administrative or clerical positions. The Bureau of Water Supply will grow from its current staffing level of 20 to 34. There will be increases in the professional, technical and clerical categories. The Environmental Laboratories will expand from 29 up to 35. The growth will occur in all categories except the administrative.

While the Bureau of Environmental Sanitation administers a Pesticide and Vector Control Program, the Kansas Department of Agriculture is the state lead agency for the Pesticide Applicator Certification Program. The Department of Agriculture coordinates the program with training sessions offered through the Kansas State Extension Service, located at Kansas State University in Manhattan, Kansas. The Extension Service offers training for both commercial and private applicators. In addition to coordination of the certification program, the Department of Agriculture is also responsible for administering various state pesticide laws which include the Kansas Noxious Weed Law, the Kansas Pesticide Use Law, and the Kansas Agricultural Chemical Law among others. Three divisions of the Department of Agriculture which have responsibility for pesticide programs are: Weed and Pesticide Division, Control Division, and Entomology Division. These divisions are staffed with a total of 30 positions: 18 professional, 4 administrative, 1 technical and 7 clerical. During the next five years the major growth in the divisions will occur in the clerical category: three positions will be added to the divisions to accommodate the added paper work generated by the pesticide applicator certification program.

The Water Resources Board is directly involved with water program planning and coordination. The Board is currently staffed with 25 positions: 17 professional, 3 technical and 5 clerical. The Board anticipates some growth during the next five years as a consequence of expanded "208" Planning activities and extended role definition.

The State Conservation Commission is also active in "208" Planning. The Commission currently has two full-time positions which are responsible for varied "208" Planning activities. The Commission projects major growth in its "208" programs during the next five years. Due to the need to coordinate the programs with the local conservation districts, the Commission may increase its "208" staffing to three professionals, 0.5 administrators, and 2.5 clerical.

The Division of State Planning and Research is also involved in "208" Planning. Its responsibility has rested with policy review. Approximately 0.6 person-years is currently apportioned to this activity. No growth is expected in this area.

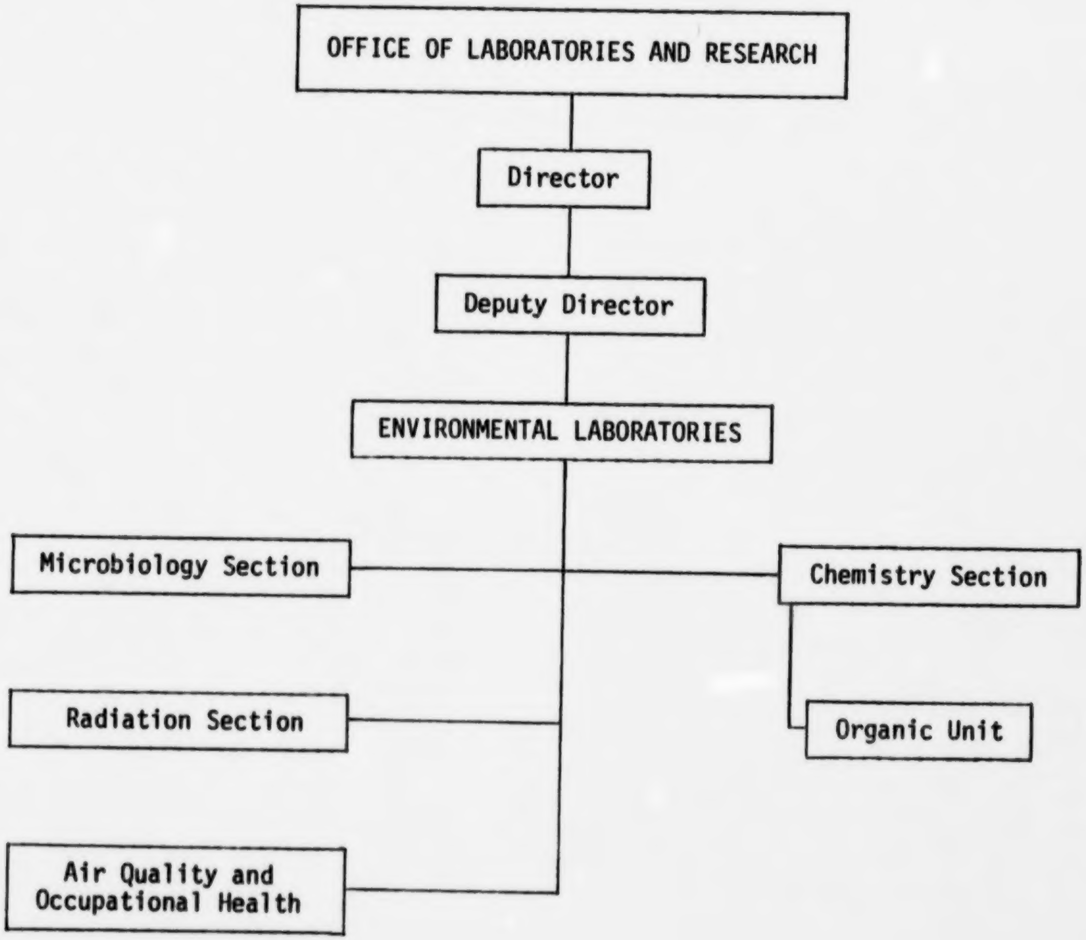
Other state agencies which are involved in environmental programs include the Attorney General's Office and the State Department of Transportation. The Attorney General's Office has broad spectrum legal responsibilities for state environmental/energy programs. The Office has two attorneys who are involved with environmental/energy programs. The Office expects to increase this effort to approximately four positions during the next five years. The State Department of Transportation has an operational noise program. The Department performs evaluations of projected noise levels for areas adjacent to proposed highway sites. The Department employs one engineer and five engineering technicians who are responsible for performing the noise evaluations. The Department does not anticipate any growth during the next five years.

Within the State of Kansas, the general thrust of energy programs has been in public relations and research. The State Energy Office is the state lead agency for conservation programs and for warehousing information concerning existing energy policies and procedures. During the last year, the Office has been developing a state energy conservation plan which outlines developmental energy conservation programs for industrial, agricultural and transportation usage. The office is currently staffed by three administrators, one professional and one clerical. No growth is projected during the next five years.

The Governor has created a Governor's Energy Commission. The Commission is responsible for designing and reviewing energy programs, priorities, and legislation. The Commission has been responsible for drafting several legislative bills which are being considered by the state legislature during this term. One legislative goal of the Commission is to develop legislation which encourages the exploration for and development of traditional energy sources in Kansas, in particular, gas and oil.

Three of the state's universities have been extensively involved with energy-related research. Projects totaling $1.9 million were reported for 1976-77. Major research categories include: oil and gas investigation, nuclear, energy conservation, solar, biomass, and general resource assessment.

Figure 1. KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT, DIVISION OF ENVIRONMENT, Organizational Chart.


OFFICE OF LABORATORIES AND RESEARCH
Director
Deputy Director
ENVIRONMENTAL LABORATORIES
Microbiology Section
Chemistry Section
Radiation Section
Organic Unit
Air Quality and Occupational Health

Pollution Control and Abatement Programs

I. AIR

A. Introduction

The first state air pollution control regulations were adopted by the Kansas State Department of Health and Environment effective January 1, 1971. They have been amended three times since then to comply with changing federal requirements. The regulations established emission limitations for various types of pollution sources which have been generally accepted across the nation. They also establish administrative and legal procedures to be followed by the source operator in establishing compliance with emission limits.

The Bureau of Air Quality and Occupational Health of the Kansas State Department of Health and Environment is the administrative office of all state air pollution control and abatement activities. The Bureau of Air Quality has four principal program goals:

1) Identification and evaluation of the effects of all contaminants in the state's atmosphere;
2) Control of all potentially harmful or objectionable contaminant discharges into the atmosphere;
3) Prevention of the accumulation of hazardous pollution concentrations in the atmosphere at any location in the state;
4) Provision of a supportive analytical instrument repair services for all programs within the department.

Within the Bureau there are four functional units: Air Monitoring, Emissions Control, New Source Review and Instrument Repair. The goal of the Air Monitoring Program is to provide the sampling resources with the manpower and equipment needed to determine concentrations of harmful pollutants in the atmosphere at representative locations throughout the state. The section performs ambient air sampling, and related functions necessary to assist in controlling air pollution as regulated by state and federal legislation. Ambient air sampling is carried out for those pollutants for which national standards have been established. The section maintains numerous intermittently operated monitoring stations, all of which contain suspended particulate samplers. These stations are operated by local citizens with supervision and maintenance by the air control technicians from this section. The section also assists the local health departments in operating additional intermittent and permanent continuous monitoring stations.

The Air Quality Monitoring Program has remained essentially the same as when it was initially developed. Total emphasis has been placed upon collecting representative data from all areas of the state concerning five pollutants which have been the subject of a national control effort since 1971. These sampling activities, except for some special short-term, continuous monitoring that has been carried out at the fixed sampling locations, are the minimum required to comply with federal law and probably will be continued during the next three to five years.

Additional federal sampling requirements will be dependent upon subsequent federal designation of pollutions. It is expected that lead will be designated as one new pollutant. While monitoring for this pollutant is not expected to materially increase program requirements, it is expected to substantially increase personnel, operating and capital costs of the department's laboratories. It can also be reasonably anticipated that a limited number of additional federal designations will be made in relation to other toxic metals, pesticides, or the variety of organic chemicals that are now suspected to cause respiratory problems, genetic mutations and cancer. Even if such designations are not made, the laboratory will need to expand its resources to provide a wider range of monitoring capabilities during the next five years.

Other new ambient monitoring requirements are expected to occur in relation to sources of fugitive dust emissions, indirect sources and "designated facilities", i.e., existing sources of pollutants subject to control under federal stationary standards for which ambient standards have not been established.

The Emission Control Program seeks to establish, in regulatory form, practicable limitations on air contaminant emissions which individually, or collectively, can adversely affect public health and welfare, or unreasonably interfere with the enjoyment of life and property. It seeks to equitably enforce these regulations in regard to all controllable sources of these contaminants located throughout the state. The Emission Control Program is responsible for either certifying compliance of or negotiating compliance schedules for all of the significant air pollution sources in the state. In excess of 5,500 possible sources of air pollution have been reported, personally inspected, evaluated for compliance with the regulations, and placed on schedules which will bring them into compliance as expeditiously as possible.

The Emission Control Program has initiated a system of annual inspections of a significant number of possible air pollution sources. The purpose of these inspections is to assure that the source continues to operate in compliance with the regulations. During the inspection, air pollution control equipment is checked to determine whether it is being properly maintained and operated. Particular attention is paid to any new or modified installations which have not been reported to the department.

This unit is also responsible for investigating citizen complaints concerning alleged pollution sources and for securing corrective actions where a source is found to be in violation of the regulations. In those instances where a determination of compliance with the regulations cannot be made at the initial investigation, regular follow-up investigations are continued until compliance is achieved.

Recent changes in federal requirements imposed under the Clean Air Amendments of 1970 have necessitated more rigorous review activities that are expected to be continued and expanded during the next five years. Approval of all significant new source construction or modification of existing sources must now also consider the effects of the controlled emissions on the existing air quality. More extensive preconstruction review are also expected to be carried out in relation to identifying processes and controls proposed for pollutants other than those required to be controlled by the federal law.

The principal objective of the New Source Review Program is to review and approve the construction of significant new sources or source modifications to assure that proposed emissions from them, when combined with other existing emissions in the area, will not cause a serious deterioration of existing air quality.

An important role of the department is the review and approval of proposed new sources. Such approval is required by the Air Pollution Control Regulations before construction of the source is undertaken. Proposed new facilities are reviewed and evaluated by the department staff to assure that they will be constructed in a manner that will be consistent with the regulatory requirements. Besides these directly reportable sources, the department also reviews and approves proposed facilities such as highway improvements and airports under federal requirements concerning environmental impact statements.

The Instrument Repair Program was developed to identify and repair malfunctions of electrical and electronic components of all types of field and laboratory analytical apparatus owned by the department. The Instrument Repair Program was initiated in late 1974. At that time it was intended only to service the electronic analytical equipment utilized in the Air Monitoring Program. After the first year's operation, it became apparent that significant reductions in both instrument "down-time" and expense were being achieved as a result of the program, and, it was deemed desirable to expand the repair services to cover all similar equipment owned and operated by the entire department. This program is expected to substantially expand during the next five years. Demands on the program will ultimately be determined by three factors: 1) the number of pieces of equipment operated by the department; 2) the degree of automation provided in individual items of equipment; and, 3) the amount of repair work that continues to be provided by equipment manufacturers under warranty or service contracts. The Bureau of Air Quality also administers the Occupational Health and Safety Program.

In addition to carrying out its direct enforcement activities, the department also provides direction to and coordinates the activities of local air pollution control programs. Three agencies, the Kansas City-Wyandotte County Department of Health, the Topeka-Shawnee County Health Department, and the Wichita-Sedgwick County Department of Community Health, directly enforce the state regulations as designated representatives of the State Department of Health. Under requirements of federal law, federal funding of these programs is totally dependent upon these delegated enforcement responsibilities. Because of this funding requirement and the state's ultimate responsibility to U.S. EPA for the statewide enforcement program, close departmental review is maintained of all enforcement activities carried out by these agencies to assure that proper regulatory procedures are followed and reported.

B. Workforce Profile

The Kansas Air Pollution Control Program is currently staffed with 30 positions: 25 professional positions and 5 clerical positions. There are 26 staff members directly involved with air pollution control and abatement activities; the remaining 4 positions are responsible for the Occupational Health and Safety Program. Of the 26 positions in air pollution programs, 22 are professional and 4 are clerical. The professional positions include engineers, administrators and non-degreed electronic and air pollution control technicians. The current staffing level by profession is depicted in Table I.

TABLE I

KANSAS STATE DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Air Quality and Occupational Health
Current (1976) Staffing Level

Position		1976
Engineer		5
Technician		16
Other		1
	TOTAL	22

The "Other" position listed in the above table is a program administrator.

The sixteen program technicians are distributed throughout all segments of the program. There are three air pollution control technicians and one engineering technician under the Monitoring and Data Analysis Section. There are two electronics technicians in the Maintenance and Calibration Section. There are two engineering technicians responsible for supervision of the enforcement program. One air pollution control technician is involved in the Engineering Section and one engineering technician in the Planning and Analysis Section. Six air pollution control technicians are charged with area field surveillance and enforcement activities. The state has been divided into six sections; one technician has responsibility for one-sixth of the state. Most of the technicians have one to two years of college and a demonstrated mechanical apptitude. In the Engineering and Enforcement Sections, however, most of the technicians have a B.S. degree in a general environmental discipline.

During the last fiscal year only one position has been added to the department: an electronic technician. Growth over the past five years has been continuous but slight. Applicants for available positions are recruited through local and statewide newspapers and through state universities. The average annual turnover for the department is 10% for professional positions. The highest turnover is in the air quality field, this being attributed to better job opportunities. Turnover in the technician field is minimal since jobs are competitive with the private sector. Many new entrants hired by the department are recent college graduates with limited professional experience. As they gain on-the-job experience, they can obtain more diverse and higher salaried jobs in the private sector.

As previously mentioned, there are three local air pollution control agencies located in Kansas City, Topeka, and Wichita. The local agencies are currently staffed with fifteen persons. Twelve of the positions are professional positions and three are clerical. The professional-technical category consists of engineers and air pollution control technicians. Table II represents the staffing of the agencies by profession.

TABLE II

LOCAL AIR POLLUTION CONTROL AGENCIES

Current (1976) Staffing Level

Position	1976
Engineer	5
Technician	7
TOTAL	12

Six of the seven technicians are non-degreed personnel with a demonstrated mechanical aptitude. One of the technicians in the Wichita agency has a degree in general environmental studies. Only one of the local agencies has experienced any growth during the past year, e.g., Wichita. One air technician was added to the staff of the agency. There has been no turnover during the past few years. Overall, the employees expressed general satisfaction with the positions. The three agencies have varying recruitment procedures. One agency recruits through the city personnel office, another through the state civil service system and the remaining one through inner-office promotions.

In an attempt to evaluate the environmental workforce situation in the private sector a variety of research techniques have been utilized. The Director and select staff of the Kansas Bureau of Air Quality were personally interviewed. The Directors of the Local Air Pollution Control Divisions were interviewed over the telephone. In addition, the private sector workforce projections were supplemented with information collected through telephone conversations with select private industries and utilities within the state.

While it should be recognized that information contained in this section represents "best professional estimates" of professionals practicing within the field, it is reasonable to estimate that in excess of 3,000 persons are involved in varied air pollution control and abatement activities in the state. There are two fundamental categories of professionals active in the field: engineers and technicians. The technician category includes electricians, instrument repair persons, laboratory technicians, laborers and maintenance personnel. While most of the 669 major sources within the state employ approximately one and one-half engineers to monitor industrial air pollution control activities, it is likely that the same industries employ an additional two full-time staff members in technician positions. The remaining 4,831 minor sources in the state may have up to one part- or full-time position with varied air pollution control activities. Based on these estimates there are approximately 1,000 engineers and 2,500 technicians employed in air pollution control positions within the industrial sector.

The annual turnover rate for all levels of positions is estimated to be between 0-5% annually. This low turnover is attirubted to good employee benefits and good salaries. Private industry employs various recruitment techniques, i.e., advertising in state and local newspapers, professional journals and by contacting and interviewing persons employed in similar positions in both the private and the public sector. The private sector does not rely as heavily upon recruitment through state colleges and universities as does the public sector. Most industrial programs prefer to hire persons with on-the-job experience.

C. Workforce Projections

The Bureau of Air Quality is expected to maintain a continued but gradual growth in the department. Workforce requirements for the program in the future will be dependent upon whether activities continue in the present direction or are drastically changed as a result of the development of new public policies at the state or federal level. Up to the present time federal law has been the overriding consideration with respect to program effort.

Possibly two major federal requirements are foreseeable by 1980 which would substantially increase manpower requirements in relation to air pollution control activities. There is a considerable likelihood that some form of environmentally oriented federal land use planning and control legislation will be forthcoming. While the state control agency would hopefully not be required to develop the necessary plans, it undoubtedly would be required to review and approve such plans initially and later review proposed new facilities to assure compliance with the zoning requirements. The workforce requirements for such reviews and approvals could double the current staff needs by the early 1980s and lead to increases up to 20 for the ten year periods thereafter.

A second possible federally required program relates to motor vehicle inspections made to determine compliance with federal motor vehicle emission standards. Such a program would probably have to be incorporated into other expected vehicular inspection programs, i.e., safety, but would increase the total state workforce requirements for such inspections by more than 100%. These latter workforce requirements might be met through either the public or private sector, depending upon the type of inspection program established. Recent developments related to the energy crisis have substantially limited federal activities in relation to motor vehicle controls, and it is difficult to foresee whether or not major renewed interest will again occur in regard to them.

As previously noted, workforce requirements for air pollution control will be highly dependent upon public policy decisions at the state and federal levels. However, since all speculation on impact of proposed federal legislation is tentative, the Bureau of Air Quality has made projections on increased workforce requirements only as they relate to existing program demands. The proposed Clean Air Amendments are expected to have little, if any, impact on the department.

The Air Pollution Control Program is expected to experience a gradual growth over the next five years. Table III illustrates the anticipated growth by professional position within the division over the next five years.

TABLE III

KANSAS STATE DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Air Quality and Occupational Health
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	5	5	5	5	5	6	10%	3%
Technician	16	16	16	17	19	21	10%	6%
Other	1	1	1	1	1	1	0	0
TOTAL	22	22	22	23	25	28	10%	5%

Any revision in this projection will be the result of either fiscal constraints or, as yet, undefined enforcement duties or new air quality monitoring requirements.

No growth is predicted for the local air pollution control agency; in fact, a decrease of two engineering positions is predicted for the Kansas City agency. This decrease is a consequence of growing fiscal constraints.

In defining the estimated growth/decline of air pollution control positions within the private sector the same method was employed in securing estimates for future growth as was used in determining the current status of the discipline, i.e., interviews with directors of air pollution control agencies and personal and telephone interviews with environmental representatives in private industries and utilities. For projections of future occupations related to air pollution control and abatement, two categories of occupations, engineers and technicians, will be the most dominant. Occupations within the air engineering field are expected to grow approximately five percent annually over the next five years; the number of technicians employed within the field is expected to grow at the same rate. The growth reflects private industry's expectation of improved and increased regulatory compliance activities.

Table IV represents rough estimates of the number of persons employed/projected in the private sector by each occupational category. These figures were extrapolated through calculation of the estimated annual growth rates. As with the public sector, all staff expansion is dependent upon fund availability which is directly related to federal legislation and economic stability.

TABLE IV

STATE OF KANSAS

Private Sector
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	1000	1050	1102	1157	1214	1274	*	5%
Technician	2500	2625	2756	2893	3037	3188	*	5%
TOTAL	3500	3675	3858	4040	4251	4462	Not Avail.	5%

* unavailable

D. Training and Certification

Kansas has a visible emission certification program for state and local agency personnel. Program activities have been restricted during the past couple of years pending the construction of a more suitable smoke generator. Approximately fifteen persons participate in the program annually.

There are no current plans for developing a visible emission certification program for private industry. However, a voluntary training program will be developed for private industry following the construction of the smoke generator. It is anticipated that up to 100 persons may attend the program annually.

Prior to 1973, an Auto Emission Training Program was offered through the Wichita Vocational Technical School. The program which trained in excess of 2,000 persons was operated from 1970 through 1973. Currently there are no official auto emission training programs; however, sections of auto mechanics training have included references to emission control.

The Bureau of Air Quality participates in a limited number of continuing education programs. Most of the in-service training consists of U.S. EPA program materials. However, the department indicated that it was not able to take full advantage of the EPA programs since the average cost of $300.00 per person per class was considered prohibitive. New departmental employees participate in an informal training program for approximately three months. The training generally consists of "employee sharing" with other staff members performing similar job functions.

E. Career Potential

Career prospects within the air pollution control and abatement field appear to have stabilized. From the available information, it would appear that there will be an average growth rate of 5% for both the public and private sectors. All projections were made with the understanding that the programs would continue performing generally the same functions; however, if federal legislation were passed which would impact the operation of the department, these projections would necessarily be altered to meet the expanded program requirements. If the department were expanded to meet additional legislative responsibilities, the private sector would probably experience a concurrent increase.

Representatives of the public and private sector have indicated that a major proportion of training for both professional and technical personnel occurs on the job. On-the-job training most generally consists of an informal sharing of work methods and techniques with more experienced personnel. The training programs which are currently offered through the state universities and technical schools do not offer the degree of technical information. Additionally, there appears to be a discrepancy between the training program curriculums and the on-the-job activities.

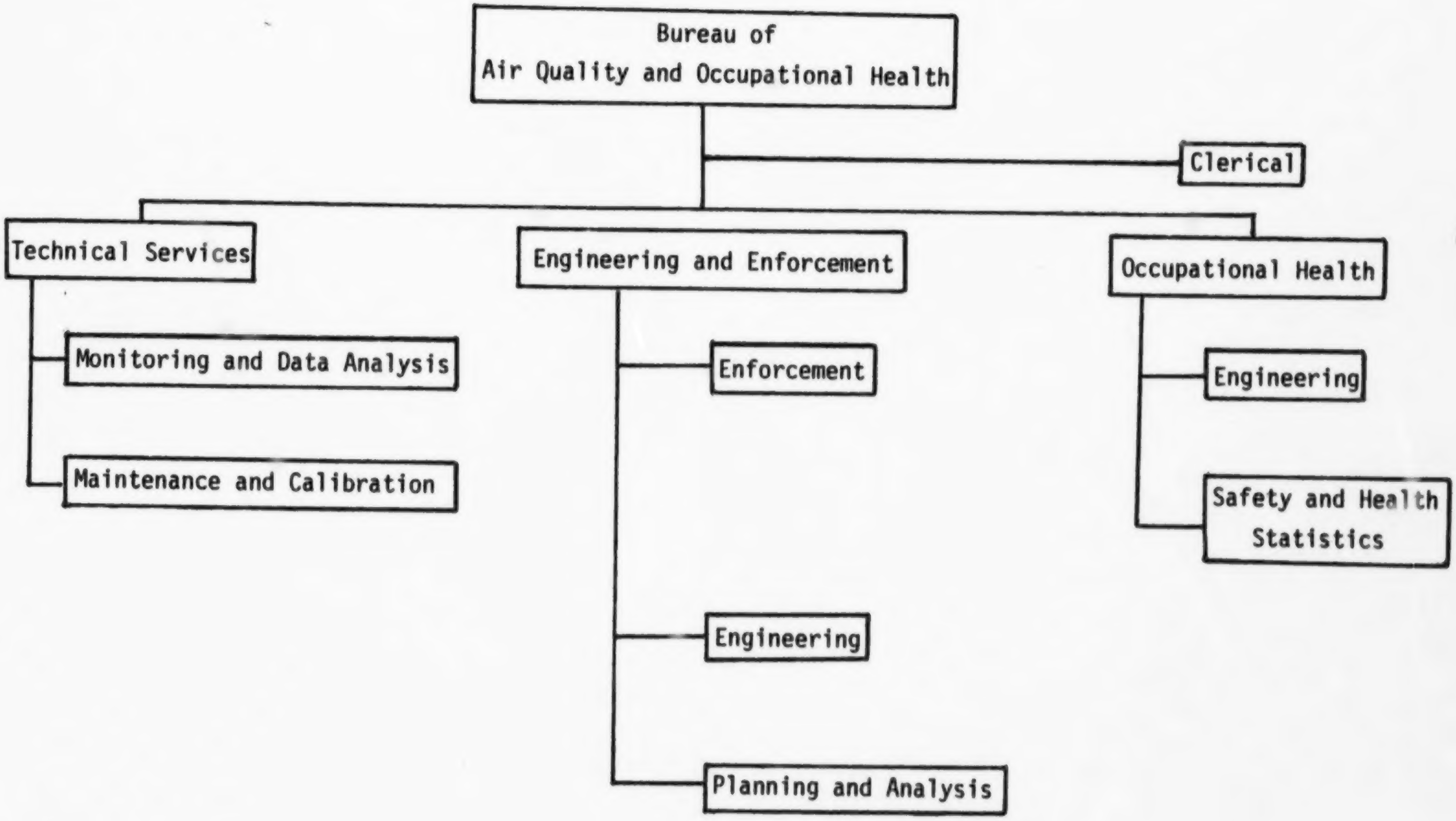
F. Conclusion

The career potential for all occupations within the air pollution control fields in the State of Kansas are reasonably stable. However, even though the workforce demands for personnel has somewhat stabilized as compared to the last five years, there will be a continuing and growing demand for qualified personnel at all levels within the air pollution control field. It has been demonstrated that qualified professionals and technicians with experience in the pollution control field are at a premium. In addition, it is important to note that technically oriented training programs for professionals and technicians are relatively scarce.

AIR QUALITY AND OCCUPATIONAL HEALTH

Organizational Chart

Figure 2


Bureau of
Air Quality and Occupational Health
Clerical
Technical Services
Monitoring and Data Analysis
Maintenance and Calibration
Engineering and Enforcement
Enforcement
Engineering
Planning and Analysis
Occupational Health
Engineering
Safety and Health Statistics

II. NOISE

A. Introduction

In the State of Kansas, noise pollution control and abatement programs have not been considered a high environmental program priority. Until recent years, few programs were operated which addressed the issue of environmental noise control. There is currently no state legislation which specifies either the regulation or monitoring of noise. In 1975 there was an attempt by the state legislature to amend the air pollution control act to include the control of noise, however, the amendment failed to pass. The Kansas State Department of Health and Environment will be actively involved in drafting a proposal for presentation to the 1977 state legislature which would once again address the issue of noise.

There are two primary state agencies which have operational environmental noise programs: the Kansas State Department of Health and Environment and the Kansas State Department of Transportation. The Kansas State Department of Health has developed an increasing interest in industrial hygiene. This interest has increased somewhat as a consequence of the Federal Occupational Health and Safety Act of 1970 (OSHA). OSHA regulations are currently performed by the Bureau of Air Quality and Occupational Health. While the main thrust of the OSHA related activities can be generally stated as "prevention of death, illness or health impairments resulting from exposure to hazardous agents in occupational situations", one aspect of OSHA compliance has involved monitoring internal industrial plant noise. While this OSHA related program has only a tangential connection with environmental/industrial noise, it has increased public awareness concerning the deleterious effects of noise.

Public interest in environmental noise control programs has grown. During the last year, the Kansas Bureau of Air Quality and Occupational Health performed 30 noise surveys as a consequence of public interest. Twenty-seven comprehensive industrial noise surveys were performed, and three community noise inspections were conducted on a cement plant, a grain elevator and a heavy equipment plant.

The Kansas State Department of Transportation administers a traffic noise control program. The general function of this program is to evaluate highway projects in regard to existing noise burdens and the predicted noise burdens that would be generated by traffic using the highway in communities near a proposed highway site. The Department of Transportation administers this program, initiated in 1972, in coordination with the Federal Highway Commission.

B. Workforce Profile

The Kansas State Department of Health and Environment currently employs two persons whose responsibilities include OSHA noise consultation activities. These two persons have a background in engineering and safety. While the major responsibilities of these two persons focus upon OSHA related noise monitoring activities, they have been providing technical assistance to municipalities in reviewing city codes, community surveys and ordinance development. Through individual consulting with local communities, they have been encouraging both municipalities and individual citizens to become involved in implementing local noise programs. Since funding for development and operation of an environmental noise program has been extremely limited, most of these program activities are available only upon request. It is estimated that less than one-quarter person-year has been devoted to community and environmental noise activities.

The Noise Control Program of the Department of Transportation is currently staffed with six full-time environmental specialists: one engineer and five engineering technicians. These six individuals are responsible for performing the noise evaluations. The program has been steadily growing since its inception in 1972. However, recently the program has stabilized; there has been no turnover in the department since the program was developed. The department generally recruits through the civil service system. The Federal Highway Administration office located in Topeka allocates 0.25 person-years to review of highway noise reports. The department is currently staffed with six civil engineers.

Parallel to the state, municipalities and private industries have relatively underdeveloped industrial/environmental noise control and abatement programs. There are currently four cities in Kansas with some type of noise ordinance. The following table depicts the type of noise ordinance that three of the cities have.

TABLE V

STATE OF KANSAS

Municipal Noise Ordinances (1975)

City	Nuisance	Zoning	Vehicle	Aircraft	Building	Construction	Recreational Vehicle
Lawrence	0		0				
Prairie Village	0	X	X			X	X
Wichita	0		0		0		

Key: X - Regulations including acoustical criteria
0 - Regulations not including acousitcal criteria

(Chart excerpted from Sound and Vibration, December, 1975. Clifford R. Bragdon, Contributing Editor.)

During the last year, Hutchinson, Kansas has adopted a comprehensive noise ordinance similar to that of Prairie Village.

Noise programs, particularly in Prairie Village and Hutchinson, are operated by the police department. Generally, one police officer has been delegated responsibility for supervision of the noise enforcement activities.

Further, it is expected that most of the major industries in the state have a designated safety officer who is indirectly involved with industrial noise activities. It should be emphasized that these employees are delegated the responsibility for maintaining a safe, hazard free in-plant environment under the OSHA compliance standards. A secondary responsibility of the safety officer could include monitoring external industrial noise levels. No information is available on the number of safety officers involved in environmental noise activities.

There is a limited amount of research being conducted within the state on noise. Dr. Steven Konz, professor of industrial engineering at Kansas State University in Manhattan, Kansas, has been involved with a limited amount of research in the annoyance factors of noise. This study was completed in 1973. Since there has been no outside funding in the noise field, most current activities have been strictly related to classroom activities.

Dr. W. D. Bernhart, professor at Wichita State University, Wichita, Kansas, was active in a 1972 National Science Foundation grant which was awarded to monitor the noise level of Wichita. This project was a student organized project. While Dr. Bernhart believes that there is a need for noise pollution control, progress toward developing a municipal noise ordinance has been slow. He has worked with the Environmental Resources Council of Wichita to assist with the design of such an ordinance, however, the concept has only received tacit approval with no apparent prospect for funding. Dr. Bernhart is also involved in conducting research on industrial noise control as it relates to engineering of equipment.

C. Workforce Projections

Over the past five years there has been an increased interest in environmental noise pollution, and it is anticipated that this concern will continue to grow during the coming five years. If the noise proposal to be submitted to the Kansas Legislature this year is adopted, a community noise program will be developed within the Bureau of Air Quality and Occupational Health. The Program would be staffed with two engineers with some background/experience in acoustics. These two staff positions will be designed with the specific responsibility of implementing a comprehensive community noise program. Their program activities would include monitoring of noise levels upon request and providing ongoing technical assistance to cities and individuals in the development of municipal noise ordinances and programs. Applicants will be recruited for these positions through local and statewide newspapers and through state universities. If an enforcement action was adopted in connection with the legislation, it would have an impact upon the departmental staffing, however, at this point it would be difficult to assess the extent of the impact.

Alternatively, the Department of Transportation Noise Control Program is not expected to experience any growth during the next five years. While the program has experienced a steady growth during the past four years, future program efforts will focus upon updating and refining of program activities and technical skills. The supportive services provided by the Topeka branch of the Federal Highway Administration are not expected to grow during the coming five years. However, it has been indicated that there may be a revision in program focus since there has been a shift from construction on interstate highways to smaller projects.

Workforce projections for the private sector are difficult to determine. Any increase in the private sector workforce will be a consequence of expanded state and municipal enforcement activities. While the State Department of Health has projected an expansion of its program, the type of program proposed by the department will not have an appreciable impact upon staffing in the private sector. Therefore, unless new legislation is passed which influences the monitoring and enforcement activities of the state and subsequently, private industry, the private sector workforce staffing levels in noise pollution abatement and control are predicted to remain reasonably constant.

D. Training and Certification

Due to the recent interest in environmental noise programs, few programs currently exist to train either professionals or technical personnel for occupations within the field of environmental noise control. Consequently, individuals with degrees and experience in acoustical engineering are scarce. In addition, there is a demand for individuals with degrees and experience in engineering, physics and related programs.

The technical schools have not as yet developed programs in noise pollution control training since the demands for such personnel are currently rather minimal.

E. Career Potential

The career potential in community/environmental noise field is currently weak; however, if the state legislature passes a proposed noise control amendment the career potential is expected to improve slightly. In this instance, the Department of Health and Environment would add two full time engineers to its staff to develop programs in community noise. While growth in noise-related personnel with private industry is not expected, there will be an increased demand for technical consultants in the field. The expected growth is therefore centered around professionals with qualifications in sound and acoustics and specifically for individuals with acoustical engineering experience.

F. Conclusion

Noise control and abatement programs within Kansas are relatively underdeveloped. However, during the next five years there may be an emerging program in community noise control. Such a program would emphasize selective monitoring and provision of technical assistance to industries in upgrading their noise monitoring and control systems and to local groups in the development of municipal noise programs. As such programs are developed and improved, there will be an increased demand for professionals with experience in noise. While there is no apparent demand for technicians in the noise field in the immediate future, it is believed that during the next ten years there may be an increasing demand for these technical positions as industries and communities become more aware of the necessity of environmental noise control.

III. PESTICIDES

A. Introduction

The Kansas Board of Agriculture is the principal pesticide regulation and control unit in the state. Until recently, the Board of Agriculture has been primarily concerned with product registration and product quality. However, the Board of Agriculture has this year become active in Pesticide Applicator Training and Licensing. The Board of Agriculture has contracted with Kansas State University Extension Service for the actual training program. The University has received a federal grant of $175,000 to develop this program. During the last half of 1976, the University began conducting the training programs throughout the state.

The Kansas Board of Agriculture has responsibility for numerous programs; however, only three of its programs have bearing on pesticide control: Weed and Pesticide Division, Control Division, and Entomology Division. The Weed and Pesticide Division administers two laws passed by the Kansas Legislature, namely: the Kansas Noxious Weed Law and the Kansas Pesticide Use Law. The Kansas Noxious Weed Control Program is intended to prevent foreign-originating weeds from encroaching into the Kansas environment and damaging its agricultural production capacity. The Pesticide Use Law, as administered, is intended to prevent pests from destroying the Kansas environment, damaging the health of persons living in Kansas and the state agricultural production, by regulating the safe use of pest-controling chemicals.

The Entomology Division is responsible for the plant protection function and pest control regulation functions in Kansas. Laws administered deal with the detection and control of insect and plant disease pests, inspection of plant nurseries, inspection of honeybees, licensing of pest control operators and nursery dealers, eradication of common barberry and surveying for detection of economic insect and plant disease pests.

The Control Division is responsible for administration and enforcement of the Kansas Agricultural Chemical Act. This act provides for the registration, labeling and sale of agricultural chemicals within the state.

The Kansas State Department of Health and Environment coordinates with the Board of Agriculture in this program. The Board of Health has continued input into the administration of the pesticide application laws through service on the Pesticide Advisory Board of the Board of Agriculture. The Board of Health has an established program, Pesticide and Vector Control, with other diverse pesticide/vector control responsibilities. The program goals include:

1) to promote the control of specific diseases and public health nuisances related to animal vectors.

2) to promote safe pesticide usage and disposal of empty pesticide containers by the general public and licensed applicators.

3) to provide advice on safe pesticide usage and emergency procedures for pesticide accidents.

4) to promote increased provision of pesticide clean-up water facilities at aerial applicator bases.

5) to reduce the health, environmental, economic and aesthetic problems created by nuisance birds in major roost areas.

This program has been designed to benefit the general public. However, there are certain specific target groups which receive greater benefit: one such target group is the people who work with pesticides on a full-time basis (commercial applicators) or whose primary occupation has major pesticide involvement (farmers). This basic program has not changed significantly during the past five years, and there is no anticipated change during the next five years. However, during the coming year one program will be expanded: nuisance bird control. The program will be designed to study the problems and to apply a remedy to the more aggravated cases which can be effectively modified. It is believed that the nuisance bird population in Kansas is now in the range of twenty to sixty million birds. A blackbird or starling will consume and waste an estimated three-quarters of a pound of grain each day. From this perspective the daily economic loss in Kansas from large nuisance bird flocks is estimated to be at least $600,000 during seasons when grain is available.

B. Workforce Profile

The Board of Agriculture employs a total of twenty-three professionals to operate the pesticide control program. Five of the professionals are under the Control Division, eight are in the Weed and Pesticide Division, and ten are involved in the Entomology Program. The following table depicts the professional staffing levels by occupation.

TABLE VI

KANSAS BOARD OF AGRICULTURE

Current (1976) Staffing Level

Position	1976
Entomologist	7
Chemist	3
Technician	1
Other	12
TOTAL	23

The twelve positions in the other category include three program directors, one pesticide use law administrator, three ecological specialists, two field inspectors, and one plant pathologist. All twenty-three positions are filled by persons with backgrounds in chemistry, entomology, plant pathology, agricultural education, biology, range management, or fish and game. The turnover rate for the department has been negligible during the past five years. The only reported turnover has been in the clerical positions. This turnover has been attributed to better paying jobs. Professional employees are recruited through the civil service system. The Department recruits through area universities such as Kansas State University, University of Kansas, and Washburn University. Secretarial and clerical employees are hired from a list submitted to the Division by the State Department of Personnel.

The Pesticide and Vector Control Section located within the Bureau of Environmental Sanitation, Kansas State Department of Health and Environment is currently staffed with one sanitarian. There has been no turnover in this section. Employees are recruited for positions through various techniques: referral from the personnel office, internal promotion, interviews at colleges and universities, and "walk-in" interviews.

The actual training responsibility for the pesticide applicator certification program has been delegated to the Kansas State University Extension Service. Dr. David Emerson, a chemist, has been appointed director of the program. Twelve members of the Extension service assist Dr. Emerson with the state program planning and coordination. Thirteen staff persons from the University provide instruction in the programs. The staff members represent backgrounds in veterinary medicine, forestry, entomology, plant pathology, horticulture, weed science, agricultural engineering, grain science, wild life damage control and home economics. The actual training programs are offered in cooperation with the county extension offices. It is estimated that 100 county agents allocate approximately 10% to 20% of their time to organizing and conducting training programs.

According to Kansas law there are two classifications of private sector pesticide applicators: private and commercial. The commercial applicator category is subdivided into ten categories: forest pest control, seed treatment, aquatic pest control, regulatory pest control, research and demonstration pest control, ornamental and turf pest control, industrial, institutional, structural and health related pest control, public health pest control, agricultural pest control, and right-of-way pest control. It is estimated that there are 360 commercial firms within the state that perform general pest control services. Approximately two-thirds of these firms are located in the eastern one-third of the state. (The population of Kansas is concentrated in the eastern third of the state.) The average crew size is approximately 3.5 persons. It is estimated that there are 80,000 farmers in the state who apply pesticides. While available information on the private sector is sketchy, it is expected that there are a number of university botanists, plant pathologist, entomologist, conservationists, agronomists, sanitarians, chemists and engineers in the state who are involved in private research and consulting in pesticide control; unfortunately no specific figures are available.

C. Workforce Projections

Within the Board of Agriculture, it is estimated that the staffing level will slightly increase in professional positions during the next five years. Two entomologists will be added to the Entomology division during 1977. The Wheat Rust Technician in the Entomology Division will be phased out by 1980 since there is a declining need for this service. There will be a cumulative increase in the staffing of the Board of Agriculture of one entomologist. The greatest increase in the department will be in the clerical category. It is anticipated that three additional secretaries/clerks will be added to the Weed and Pesticide Division. This increase is due to the Pesticide Certification Law. These staff members will be delegated responsibility for processing the pesticide applicator certification applications.

During the fiscal year 1978, the Pesticide and Vector Control Program proposes to expand its activities to include a Nuisance Bird Control Program. One person will be added to the department who will be responsible for the operation of the program. A person with background and experience in Zoology and Ornithology will be recruited for the position.

As the Pesticide Applicator Certification Program grows, there will be a significant increase in the amount of time that the Kansas State University Extension Service allocates to the pesticide applicator training program during the next five years. As the demand for upgrade training programs and certification training programs increase, it is anticipated that the number of university staff members providing program instruction will approximately double. The amount of time that the county agents allocate to the program will also increase an average of 5% to 10% annually. The county agents will be increasingly involved in the upgrade and certification training as the program becomes more fully operational.

There will also be a substantial growth in the number of commercial applicators during the next five years; an average annual increase of 10% is expected. This growth can be attributed to stricter state certification enforcement activities. In addition, there has been a trend toward use of more sophisticated chemicals which require more experience and knowledge to apply. Farmers will probably seek professional assistance in the application of these chemicals. It is further expected that there will be a growth in the number of commercial and industrial operations using professional applicators during the next five years with an average annual growth of 10-15%.

There is no available information on the annual turnover rate or recruitment procedures for this category of worker. Further, experts within the field indicate that there is no emerging legislation or technology which will have a bearing upon workforce projections.

D. Training and Certification

The principal thrust of pesticide training within the state is focused upon pesticide applicator training. Kansas State University Extension Service has been delegated the authority for coordination of this training. The 105 county extension offices are involved with coordinating and scheduling the local private applicator training. The county extension agent has been delegated the responsibility for organizing the training programs. The county agent is currently commiting 10% to 20% of his/her time to pesticide applicator training activities. During 1976 a total of 45,000 private applicators were trained in approximately 650 classes held through the state. During the training sessions the applicators are given the opportunity to take the state Pesticide Applicator Certification Examination. The Board of Agriculture and the Extension Service cooperate in the examination process. The training program was developed in compliance with the mandates of the Federal Environmental Pesticide Control Act and is offered for two or four hours.

The county extension service areas are not the prime focus for the training of commercial applicators since commercial training is offered by occupational category with the training session held in locations most advantageous to the majority of the participants. A commercial applicator must enroll in two types of training programs: general standards program and special category. The general standards program includes a review of federal and state regulations and generalized application skills and knowledge. The category training provides a background and introduction to technology relevant to the particular type of application category. It has been estimated that approximately 4,000 commercial applicators in the state will seek certification. During November and December of 1976, twenty one-day commercial training programs were offered: approximately 2,600 commercial applicators participated in the certification training. Training was offered in all categories except for public health pest control and regulator pest control; however, sessions have been planned for these two categories. The following table represents the distribution of commercial application involved in the November-December training session. The second column illustrates the anticipated average number of persons to be trained annually.

TABLE VII

PARTICIPANT-COMMERCIAL APPLICATOR TRAINING

Classification	Number Participating	Average Number to be Trained Annually
Agricultural Pest Control	1,200	2,000
Forest Pest Control and Ornamental and Turf Pest Control	225	225
Seed Treatment	125	500
Aquatic Pest Control	25	100
Right-of-Way Pest Control	150	200
Industrial, Institutional, Structural, and Health Related Pest Control	200	500
Demonstration and Research Pest Control	50	250
Public Health Pest Control	200 (est.)	200
Regulatory Pest Control	200 (est.)	200
TOTAL	2,375	4,175

The Kansas Extension Service will be a primary means of keeping applicators up to date with changing technology and a continued suitable level of competency. It is required that applicators enroll in a minimum of one training session averaging two to four course hours every three years to update the certification license. Private applicators will constantly receive additional information concerning pesticide application through on-going county by county training programs and through the communications media. Most county extention directors have regular radio programs, and a portion of the program time will be used to update information on pesticide usage. With regard to the commercial applicators, the Cooperative Extension Service expects to utilize an existing framework of seminars, short courses, and conferences. There are several organization and conferences in Kansas that are currently meeting on an annual basis. It is anticipated that these organizations and conferences will be a medium for distributing information.

In addition to the actual pesticide applicator certification training programs, the Extension Service is currently developing a series of skill upgrade training programs for each of the ten categories of commercial applicators. During the commercial applicator training programs offered last winter, a number of applicator/operators expressed an interest in ongoing skill development training. The first program which is being planned is an upgrade training program in public health insect control. Other programs in the planning stages are Rodent and Weed Control and Vector Approaches. The courses will range in length from ten to twelve hours per course. It is anticipated that up to three hundred persons may attend each course. No courses are currently being developed in the other commercial categories; however, planning will begin within the next year. The courses will be offered in coordination with the county extension offices.

E. Career Potential

The career potential for personnel in the private sector appears reasonably bright, while the public sector programs will be relatively stable through 1982. It is projected that there will be a major increase in the demand for commercial applicators as a result of stricter enforcement activities and increased dependency upon more sophisticated chemicals.

These factors will also impact three additional emerging occupations. Three types of occupations which appear to be evolving are: commercial pesticide consultants, pest management specialist, and irrigation specialist for disease and insect control. While these professions are in existence to a limited degree at present, the demand for these specialities will grow significantly. The skills and knowledge bases required by professionals in these occupations will continue to diversify as new technology and more sophisticated chemical pesticides are introduced onto the market.

F. Conclusion

Following a review of pesticide pollution control activities in the State of Kansas, these conclusions can be made:

1) that the workforce situation in the public agencies is expected to remain reasonably constant through 1982.

2) that the private sector pesticide related occupations will experience a rapid growth and diversification as legislative enforcement activities increase and as new, more complex chemical pesticides are introduced onto the market.

3) that there is no apparent emerging legislation which will significantly impact either the state or in-state workforce profile.

From these conclusions it is apparent that there will be an increased reliance upon the commercial applicator and that the private farmer will not be involved in pesticide application to the degree experienced over the past five years.

IV. POTABLE WATER

A. Introduction

The Kansas Bureau of Water Supply supervises 683 public water supplies with their own source of supply and 163 systems that purchase treated water from another water system. These systems serve approximately 85% of the state's 2,020,000 residents. Public water systems include those which serve cities, rural water districts, improvement districts, small subdivisions, mobile home parks, Kansas turnpike authority service areas, some of the Kansas park and resources authority facilities, some airports, and all state institutions. There are an undetermined number of water supplies at roadside restaurants, service stations and motels serving the traveling public. The State of Kansas is investigating the possibility of developing a public water supply inventory within the next fiscal year to locate these sources. In addition, there are individual water supplies which serve approximately 335,000 residents.

The Kansas Department of Health and Environment is the state lead agency for the Kansas water program. The Bureau of Water Supply within the Division of Environment is the principal administrative unit for the potable water program. As such, it is the responsibility of the Bureau to ensure that all public water supplies are continuously operated and maintained so that the water meets defined quality standards, that there is an adequate quantity, and that the water is satisfactory for ordinary domestic consumption .

B. Workforce Profile

In general, Bureau program operations consists of plan, specification, and permit application review, engineering field appraisals, post-construction inspections, collection of samples, and training of operators. In addition, the Bureau promotes sound waterworks practices by providing a variety of services to cities, rural water districts, consulting engineers, state and federal agencies, individuals, and equipment suppliers.

To carry out its mandates the Bureau is currently staffed by six persons and receives part-time service from twelve other Division personnel as depicted by the following table. It should be pointed out that this staffing configuration represents headquarters personnel (four) and the six district offices (seven*).

TABLE VIII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Supply
Current (1976) Staffing Level

Position		1976
Engineer		8
Engineering Technician		2
	TOTAL	10

The headquarters office is staffed with one director and three sanitary engineers who devote 100% of their time to water supply activities. The district offices are each staffed with one district engineer and one engineering technician. Two of the district offices also have a second engineer. The district engineer devotes approximately 30% of his/her time to the public water supply programs, the technicians devote approximately 30% of their time to water, and the two additional engineers spend 100% of their time on water programs.

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* These numbers have been rounded to the nearest whole number.

Prior to 1976, the public water supply program was a component of the Water Quality Section; however, due to the increasing responsibilities related to public water programs, a separate bureau was developed for water supply programs.

There was no turnover within the Bureau of Water Supply during the last fiscal year. This departmental staffing stability is attributed to the increasing competitiveness of state salaries with the private sector. Engineers are recruited through state universities, technical journals, newspapers, and on a "walk-in" basis. The technicians are recruited through other state departments and vocational/technical schools.

The Bureau's efforts are supported by the chemistry, microbiology, and radiation sections of the environmental laboratories component of the Office of Laboratories and Research. The Water Chemistry Section devotes approximately 40% of its total effort to potable water programs, which includes activities in organic and inorganic analysis. The Water Microbiology Section allocates approximately 70% of its effort to potable water activities among which are microbiological analysis for bacterial contamination and operation of a continuous monitoring effort as outlined in the Primary Drinking Water Standards. The 15-20% of its effort that the radiation section provides to potable water focuses on monitoring radioactivity levels in Kansas water supplies. Clerical support is provided by a laboratory clerical pool. Currently these sections are staffed as follows:

TABLE IX

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Water Microbiology Section
Current (1976) Staffing Level

Position	1976
Microbiologist	4
Laboratory Technician	2
TOTAL	6*

TABLE X

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Water Chemistry Section
Current (1976) Staffing Level

Position	1976
Chemist	7
Laboratory Technician	4
TOTAL	11

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*These numbers have been rounded to the nearest whole number.

TABLE XI

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Radiation Section
Current (1976) Staffing Level

Position	1976
Chemist	2
TOTAL	2

There has been no staff increase in the three sections during the past year, and there has also been no turnover. The low level turnover has been attributed to good working conditions and competitive salaries in addition to the tight employment market. Most turnover is related to staff retirement. When position vacancies occur, they are filled through recruitment at state colleges and universities, and through advertising in newspapers and professional journals.

There are approximately 707 public water supply systems in the state. The systems are categorized according to a Department of Health and Environment classification system. There are four classes: Class I, Class II, Class III, and Class IV, each relative to the type of treatment being carried out, e.g., coagulation, lime softening, filtration, chemical feeding.

According to Department Regulations, Class I systems include all distribution systems without regard to population and chlorination systems with or without fluoridation serving a population of less than 500 persons. Classes II, III and IV provide the same basic categories of service; however, there is a distinction in the populations which they serve. The two categories of service are:

1) chlorination with or without fluoridation;
2) coagulation: lime or limesoftening; sedimentation and filtration in conjunction with chlorination; ion exchange softening; reverse osmosis; iron and/or manganese removal; any one or combination of the above.

Under procedure one, chlorination, Class II systems serve populations between 500 and 2,500 persons; Class III serves a population of between 2,500 and 20,000; and Class IV serves populations of over 20,000. Under procedure two, Class II serves populations of less than 1,000; Class III serves populations of 1,000 to 10,000; and Class IV serves populations of over 10,000.

Class I systems are the smallest; there are 359 Class I operations in the state. Class II systems are slightly larger: there are 239 Class II water supply systems in Kansas. There are 88 Class III water supply systems located in the state; Class III systems generally provide service to medium sized communities. The Class IV water supply systems are the largest; there are only 21 Class IV systems in the state.

The 359 Class I water supply systems generally have a combined operation with the municipal wastewater treatment facility. The system is frequently supervised by one operator. The turnover in Class I plants is minimal.

Frequently, the Class II water supply systems have a combined operation with the municipal wastewater treatment facility. Staff is generally shared between the facilities. The average crew size is approximately three persons: one supervisor, one operator, and one maintenance person.

Turnover within the system is estimated at 0-5%, with most turnover resulting from retirement. Recruiting of applicants is accomplished through advertising in newspapers and trade journals.

Like the Class I and Class II systems, the Class III system is often combined with the wastewater treatment program. The average crew size for a Class III water supply system is approxiamtely six. The crew is frequently composed of one supervisor, three operators, and two maintenance persons; however, this varies according to the needs of the particular plant. Turnover is minimal. Applicant recruitment is affected through advertising in newspapers and trade journals.

The staffing level of the 21 Class IV systems varies greatly; the staffing levels range from 10 persons up to 200 in the larger metropolitan areas. Three of the largest programs are located in Kansas City (Kansas), Topeka, and Wichita. Using Kansas City as an example, the Class IV system serves 185,000 persons and has an operating staff of 156 persons. The Customer Service Department is staffed with 21 persons: 6 in data processing; 6 in general accounting; 3 in internal audit systems; 4 in material control; and 1 special service coordinator. The Operations Section is staffed with 50 public utility specialists. There are 11 in the engineering section. There are 23 specialists in the maintenance department with backgrounds as electricians, mechanics, and instrumentation specialists. The Production Section employs 4 administrators, 3 clerical, 24 water treatment plant operators and 6 laboratory technicians. The turnover for upper level positions within Class IV systems generally averages 0-5%. Turnover for laborer positions, however, may run as high as 25% annually. Most programs recruit through advertisments in newspapers and trade journals.

The exact number of persons employed in the water treatment field is not available; however, it is estimated that there are 700 operators in the state, with approximately 400 of those certified. No other information is maintained by the state on the number of operators by plant classification. The Bureau of Water Supply, which was organized within the past two years, is in the process of designing an information data bank which will coordinate much of the missing information.

C. Workforce Projections

The Bureau of Water Supply is expected to grow by about 17% annually during the next five years. The greatest growth will be experienced in the number of technicians employed through the district offices. The growth in the number of technician positions is a direct consequence of increased enforcement activities under the Safe Drinking Water Act. The Kansas state legislature is currently considering a bill that would revise the existing state public water supply law. Revisions in the existing law propose to bring it into compliance with the federal regulations postulated in the Safe Drinking Water Act and to update the law in accordance with changing technology. The following chart depicts the growth within the Bureau of Water Supply.

TABLE XII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Supply
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	8	12	12	12	14	14	0%	10%
Eng. Technician	2	2	2	5	8	8	0%	42%
TOTAL	10	14	14	17	22	22		17%

This growth is attributed to an overall increase in enforcement activities. The environmental technical assistance program will be focusing upon providing direct services to the areas and municipalities to assist them in complying with the regulations of the Safe Drinking Water Act.

There will be considerable growth in the amount of support provided by the Office of Laboratories and Research to the Bureau of Water Supply during the next five years. The Water Chemistry Section will increase its commitment from 40% to approximately 50-55% with an annual growth of approximately 2-3% per year. This change will be a result of the section assuming responsibility for sampling privately used wells that connect with main aquifers. The effort of the Water Microbiology Section will undergo a substantial growth as a result of the Safe Drinking Water Act. The section currently performs analysis for 700 to 800 public water supplies. This is expected to increase by approximately 40-50% with an estimated 1,200 water supplies served. The bulk of this increase will occur from 1979 to 1981 due to bringing new community public water supplies into the program.

The support provided by the Radiation Section will also grow. The radiation section, which is just initiating its involvement in monitoring of drinking water for radioactivity, will increase its support from 20% to about 35% of staff time. This will amount to about 3-5% growth per year. This growth is also attributable to regulations of the Safe Drinking Water Act.

The following tables represent projected growth in each of these sections up to 1982:

TABLE XIII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Water Microbiology Section
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Microbiologist	4	4	4	5	5	5	0	5%
Lab Technician	2	2	2	3	3	3	0	10%
TOTAL	6	6	6	8	8	8	0	7%

TABLE XIV

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Water Chemistry Section
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Chemist	7	8	8	8	9	9	0	5%
Lab Technician	4	4	4	4	5	5	0	5%
TOTAL	11	12	12	12	14	14	0	5%

TABLE XV

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Office of Laboratories and Research
Radiation Section
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Chemist	2	2	2	2	2	2	0	0
TOTAL	2	2	2	2	2	2	0	0

A partial survey of all four classifications of water treatment plants revealed that there is no expected expansion of operations in the Class I and II plants; however, the Class III and IV plants indicated that they expected limited growth during the next five years. The exact amount of growth can not be estimated. The growth in some instances will be related to expanded program operations and extension of services to small communities. All four classes indicated that there may be some growth in the laboratory area as a consequence of state and federal legislative requirements. Other projections were not available, since the directors indicated that frequently growth within their department is directly attributable to increased federal regulation. While there is no pending legislation which would impact their programs, they did not rule out the possibility that such legislation might be introduced.

D. Training and Certification

The State of Kansas has a mandatory water supply system operator certification program. The mandatory program was adopted in September

1976; however, prior to that time, many system operators participated in a voluntary certification program which was developed in 1956. The Department of Health and Environment cooperates with the University of Kansas Division of Continuing Education on this program. Approximately three to five courses are offered per year. During 1976-77, 349 persons will have participated in the program. During 1978, it is expected that an additional 600 persons will enroll in the program. However, from 1979 through 1982, it is anticipated that the number of persons certified annually will range from 300 to 500 persons per year. There is no available breakdown on the number of persons certified by system classification.

In addition to the certification program offered through the Department of Health and Environment and the University of Kansas, the Kansas Section of the American Water Works Association offers three workshops per year. The topics and content of the workshops vary according to need. During 1976, 225 persons participated in these workshops. The number is expected to remain stable through 1982.

The staff members of the Bureau of Water Supply are encouraged to participate in continuing education. Tuition grant programs are available through the department for persons who qualify. About one person per year takes advantage of the program. Kansas State University and the University of Kansas both offer excellent programs in environmental engineering. However, other such programs are scarce.

The Office of Laboratories and Research will be responsible for 9 new environmental laboratory certification programs. All laboratories that are involved with the production of data for NPDES or drinking water permits will require certification. The Kansas State Legislature recently passed this legislation, and the program will begin in 1977. There are approximately thirty such laboratories in the state. No information is available on the breakdown of these laboratory crews by number or by occupational type.

Staff members of the Office of Laboratories and Research participate in continuing education provided through U.S. EPA and the University of Kansas; however, no exact figures are available on the number of persons that are involved in the programs annually.

E. Career Potential

Career prospects for all levels of personnel involved in the state public water supply program are extremely optimistic. The career opportunities within the state office will continue to grow during the next five years as a consequence of the Safe Drinking Water Act.

Career opportunities within the private sector are more limited. There appears to be no significant expansion plans within Class I and Class II plants. There will be limited expansion within the Class III and Class IV plants. Growth in these two plant classifications will be related to expanded program operations and extension of service to small communities. The state legislature has recently adopted a certification requirement for water analysis laboratories. The exact impact of the certification program is not known; however, there may be an increase in laboratory staff as a consequence of the enforcement activities. Turnover within upper level positions is low, and most of these positions are generally filled through internal promotion. Most job opportunities within the private sector will continue to be in the lower echelon positions. Turnover within these positions is low, with the exception of the laborer category. Turnover for these may run as high as 25% annually.

F. Conclusion

Three basic conclusions can be drawn from the preceeding information available on the status of the public water supply workforce within the State of Kansas:

1) that the Safe Drinking Water Act will continue to exert an impact upon the staffing of the state and district Bureau of Water Supply Program; however, the act will have a rather minimal impact upon the in-state workforce;

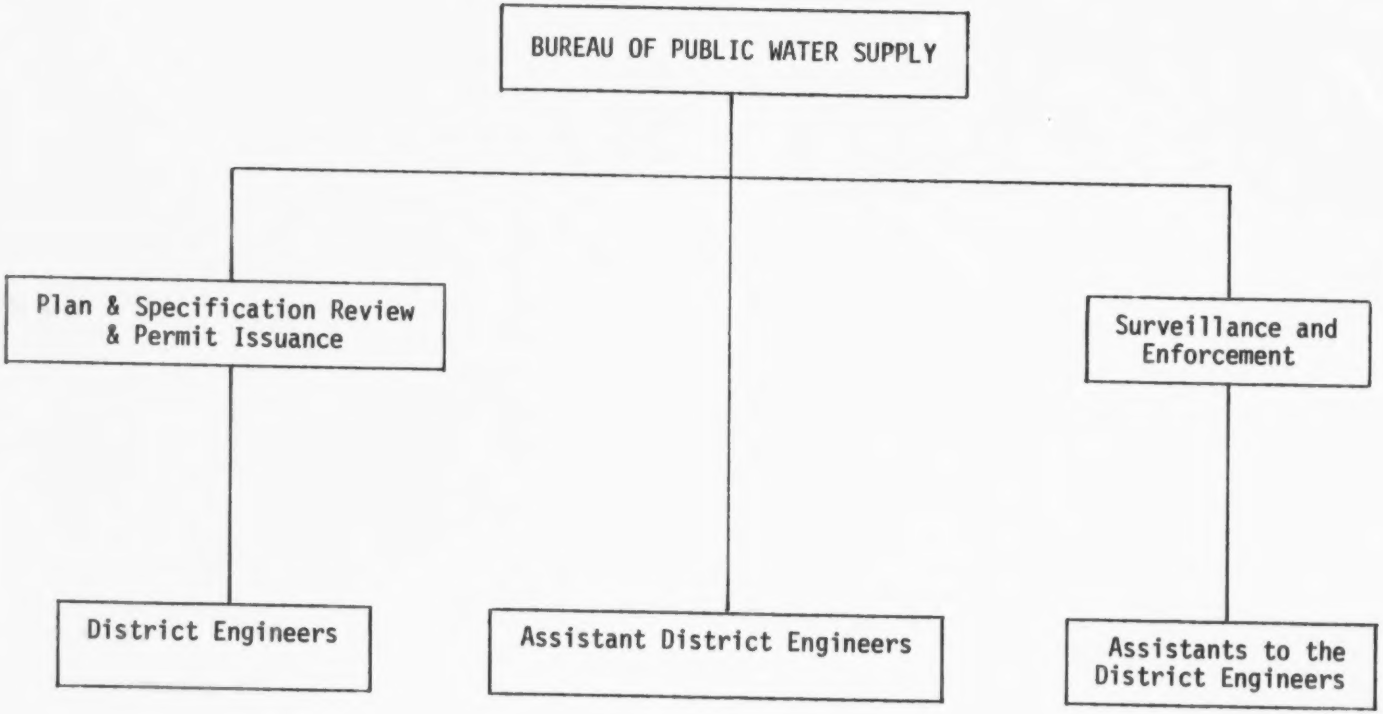
2) that legislation recently passed by the state legislature requiring the certification of laboratories performing NPDES and drinking water analysis will have an impact upon the laboratories' staffing patterns, however, the exact extent of this impact is not known;

3) that the state and local water supply systems have experienced minimal difficulty in locating qualified applicants for existing positions.

These conclusions suggest that the water supply field in the State of Kansas will continue to grow during the next five years. However, since neither the state nor local municipalities have experienced difficulty in recruiting qualified applicants, there is only a minimal need for expanding educational programs to address specific public water occupational needs. From all the information gathered, it would appear that the existing educational programs are providing good training opportunities and are educating sufficient students to meet most emerging demands in the field.

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

DIVISION OF ENVIRONMENT


BUREAU OF PUBLIC WATER SUPPLY
Plan & Specification Review & Permit Issuance
Surveillance and Enforcement
District Engineers
Assistant District Engineers
Assistants to the District Engineers

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

DIVISION OF ENVIRONMENT

Figure 3

V. RADIATION

A. Introduction

The Bureau of Radiation Control which is located within the Kansas State Department of Health and Environment is the primary environmental radiation and radiological health administrative agency within the state. The program has five principal goals: 1) to control radioactive materials, 2) control radiation producing devices, 3) respond to radiation emergency or accident situations, 4) environmental radiation monitoring, and 5) state, federal and local government relations.

The Bureau has been delegated responsibility for review of proposed radiation programs prior to authorization and for conducting inspections of the facilities after authorization. The inspections are conducted to ensure that radioactive materials used in Kansas are: 1) not responsible for exposure levels in excess of those needed to accomplish the task, and 2) are properly handled and disposed of. Secondly, the program attempts to identify and inspect the facilities using radiation producing devices. The inspections ensure that such devices maintain exposure levels as low as practical and below the established standards.

Another activity of the program has been to design and implement an emergency response system. The system has been developed to mitigate or prevent serious exposure to individuals or contamination of the environment as a consequence of an emergency involving radiation or radioactive materials.

The department monitors the environment in an attempt to identify improper handling of radioactive materials by private users. In addition, the departmental staff maintains contacts with state, federal, or local units of government to assist, where necessary, in performing evaluations involving radiation or radioactive materials.

For the coming five years, the department has outlined five basic program objectives:

1) to maintain and improve the quality and quantity of both licensing and inspection of radioactive materials use;
2) to maintain the quality of radiation producing device inspections and develop additional competence in complex systems and non-ionizing inspection;
3) to provide for additional staff training and develop greater competence among other emergency response organizations involving radiation;
4) to decrease area-wide fallout monitoring and institute point source and drinking water monitoring programs;
5) to continue federal compliance activities and to seek compliance with emerging mandates.

It is anticipated that the following results will be accomplished through these program activities:

1) The quality of the radiation protection program will be significantly improved through increased and improved inspections.
2) The section will have categorized the locations of significant non-ionizing radiation devices and assessed the hazards of each.

3) The professional staff members will be trained to respond to emergencies resulting from radiation or radioactive materials.

4) The department will have developed adequate monitoring procedures to assist with the identification of any increase in environmental radiation from users of radioactive materials or the proposed nuclear power plant and will have analyzed public water supplies under the Safe Drinking Water Act.

5) The department will be operated in compliance with applicable federal standards.

The current program has two general functions: 1) radiation equipment registration, and 2) general environmental surveillance. The general surveillance program has three primary program activities: 1) data collection for the Wolf Creek Nuclear Reactor Project, 2) collection of samples from program licensees, and 3) maintaining records on radiation fallout and related nuclear testing. Under the radiation equipment licensing function, Kansas has a regulatory registration program for radiological health X-ray programs. There are an estimated 1600 dental and 2084 medical X-ray programs which have Kansas registration. In addition, there are 185 non-healing art X-ray programs and 289 facilities with Kansas Radioactive Materials Licenses issued pursuant to the Kansas NRC Agreement. (Statistics taken from a report prepared for the U.S. Department of Health, Education and Welfare, Report on State and Local Radiological Health Programs, October 1976.)

The 298 facilities with Kansas radioactive materials licenses are a combination of in-state and out-of-state corporations licenses in Kansas. Kansas has developed the following classification system: Medical-Private, Medical-Institutional, Industrial, Civil Defense, and Other. There are 28 medical-private, 42 medical-institutional, 93 industrial, 2 civil defense, and 12 other facilities within the state. The remaining 73 are industrial corporations, individuals, and firms conducting business within the state but based elsewhere. A majority of the industries using radioactive materials are using it in sealed source gauges for measuring density of materials. The 81 industries using sealed source gauges include petroleum industries, chemical refineries, soap producers, and aircraft manufacturers.

As an Agreement State, Kansas has the option of developing a state plan for disposal of radioactive materials within the boundaries of the state. Three types of methods of disposal can be utilized: 1) they can be introduced in small quantities into the sanitary sewer system; 2) they can be buried in small amounts; or 3) when there is a large quantity, they must be shipped to a commercial licensed radioactive waste disposal firm. Several years ago, Kansas explored the possibility of disposing of radioactive materials in abandoned salt mines. The Kansas State Board of Health, in cooperation with the State Geological Survey Office, explored this possibility and determined that radioactive material disposal in the mines would not be attempted at present.

B. Workforce Profile

The Bureau of Radiation Control is currently staffed with three full-time professionals, three full-time technicians and two clerical persons. There has been no growth in the Bureau over the past two years. The following table illustrates the distribution of staff by occupational type.

TABLE XVI

KANSAS STATE BOARD OF HEALTH AND ENVIRONMENT

Bureau of Radiation Control
Current (1976) Staffing Level

Position	1976
Administrator	1
Technicians	3
Health Physicists	2
TOTAL	6

The technician category includes two radiation protection specialists and one radiation program control inspector. Turnover in positions has been relatively low during the past two fiscal years: only one person has left the department to return to school. This low rate of turnover has not been indicative of the general trend. Over a ten-year period, the average annual turnover has been approximately 15%. The low turnover during the past two years has been attributed to the instability of the Kansas economy.

The Bureau recruits through personal contacts, newspapers, national health physics journals, and colleges and universities. Recruiting health physicists presents a real problem, since they are especially scarce within the midwest. Most state agencies are not able to compete with private industry on salaries.

Workforce statistics on the "radiation control" occupations within the private sector are difficult to assess. However, the Bureau of Radiation Control was able to provide a general overview of activities within the state. Professional estimates indicate that universities, hospitals, and physicians/dentists account for a major proportion of the private sector radiation programs. While physicians and dentists operate approximately 3600 X-ray programs, it has been estimated that staff time allocated by their offices to radiation surveillance is minimal. Monitoring and control of "radiation" at these sites is provided through periodic visits by the Bureau.

There are approximately fifteen companies in the state that are involved with industrial well-logging. They employ approximately two to three persons per company; there is an estimated 30-45 persons employed in the state. Most of these persons have backgrounds in engineering or an engineering and geography combination.

The University of Kansas, University of Kansas Medical Center and Kansas State University employ one or more radiation protection specialists, health physicists and radiation technicians. The exact number is not available. In addition, there are five to six persons at each Center who are responsible for regulating radioactive research materials.

There are an estimated 160 industries in the state that use some radioactive materials in production. As previously mentioned, the majority of these industries use the radioactive materials for gauging activities. For example, a radioactive capsule is placed in the wall of a pipe. Monitoring of the pipe indicates how fast the wall of the pipe is disintegrating. Most, if not all, of the radiation control activities for industry are handled by consultants or by the State Department of Health and Environment. There is no available information on the number of consultants active in this area; however, it is expected to be quite low.

C. Workforce Projections

During the next five years the Bureau expects to expand its staff by three positions. In Fiscal Year 1979, an additional public health physicist position will be added to respond to the increased workload brought about by the more complex X-ray equipment and new non-ionizing radiation devices. A Radiation Control Inspector will also be added in 1979. The Inspector will be needed due to the increased workload resulting from the Safe Drinking Water Standards, the proposed Wolf Creek Nuclear Reactor Plant and the Environmental Surveillance and Emergency Response Program. By Fiscal Year 1981 a third Radiation Production Specialist will be required. This position will be added in response to the continuing growth of both the number and complexity of licenses.

Increases within the private sector are expected to be slight. There is a continuing steady increase in licenses being issued. However, the demand for private sector personnel has not grown at the same rate.

D. Training and Certification

The Bureau of Radiation Control provides new job entrants with extensive on-the-job training. As was mentioned previously, persons with qualifications in radiation and health physics are scarce. As new employees start their jobs with the Bureau, they are provided with an introduction to radiobiophysics and regulations. During the first few months on the job, the new employees work with more experienced staff members in the field to obtain experience in licensing procedures, monitoring and evaluation.

All staff members are encouraged to participate in continuing education. Most have attended the ten-week short course in Health Physics offered by the Oak Ridge Associated Universities sponsored by the U.S. Nuclear Regulatory Commission. Staff members also participated in the emergency response training program. While the exact amount of person-time allocated to continuing education varies each year, the average person participates in approximately four weeks of continuing education training annually.

E. Career Potential

The overall career potential for existing professional occupations in the radiation control field is considered by experts to be extremely bright. There is an increasing interest in professions focusing on non-ionizing radiation, e.g., microwaves, lazers, and ultra-violet radiation, and their relationship to health.

While career potential for existing occupations may be strong, the use of radiation in research and experimental treatment may become more and more limited. Private sector radiation control occupations may not experience any growth; however, this will have an inappreciable impact on the radiation control workforce level since there is a limited number of persons currently involved in private sector radiation control.

F. Conclusion

Two fundamental conclusions are manifest following a review of the workforce projections for radiation control programs in the State of Kansas:

1) that radiation control programs within the state are just emerging, and that the future focus of the programs may be expanded to include non-ionizing radiation; and

2) that the career potential for professional occupations in radiation control is extremely bright; however, persons trained in health physics and radiation control are scarce.

Training programs which educate health physicists have limited availability. Educational institutions have not extensively explored the feasibility of developing such programs. With the growth in demand for professional positions in the field, educational institutions might well review the possibilities for developing such training. As educational institutions explore the possibilities for developing health physics programs, they should coordinate their efforts with the Kansas State Department of Health and Environment.

VI. SOLID WASTE

A. Introduction

The Bureau of Environmental Sanitation of the Division of Environment is the primary Solid Waste Management agency within the State of Kansas. The statutory authority for the broad spectrum activities of the Bureau of Environmental Sanitation is contained in K.S.A. 65-101, Public Health, Secretary of Health and Environment, General Powers and Function. The legislation authorized the following activities:

1) the bureau will make sanitary investigation and inquiry concerning the causes of disease;

2) it shall make inquiry concerning the causes of diseases and especially epidemics and endemics;

3) it shall investigate the cause of mortality and effects of locality, employments, food, water supply, habits, conditions, and other circumstances upon the health of people;

4) it shall advise officials of government, or other state boards, in regard to location, drainage, water supply, disposal of excreta, heating and ventilation of public buildings.

In addition to the above responsibilities, a wide variety of expanding activities and services are administered by the Bureau of Environmental Sanitation: 1) solid waste, 2) vector and pesticide control, 3) child care, schools, hospitals, and nursing home facilities and environment, 4) recreational sanitation, 5) private water supply, 6) private sewerage, 7) mausoleum construction, 8) environmental nuisances, 9) advice and resource reserve to local health officers and departments, and 10) disaster and emergency sanitation.

The Bureau of Environmental Sanitation is divided into four sections: Solid Wastes Management Section, Pesticide and Vector Control Section, Institutional Sanitation Section, and Recreational Sanitation Section. Two sections of the Bureau of Environmental Sanitation will be covered extensively within this section of the report: the Solid Wastes Management Section and the Recreational Sanitation Section. The Solid Wastes Management Section functions in three areas: 1) solid wastes management (the collection, transportation, processing, disposal and regulation of solid wastes), 2) resource recovery and source reduction, and 3) hazardous waste management. This section has seven program goals:

1) elimination of dumps and other non-satisfactory methods of handling solid wastes;
2) supervision of the ongoing operation of safe and effective solid wastes management;
3) promotion of public motivation to eliminate littering;
4) development and encouragement of source reduction and recycling of solid wastes;
5) identification and location of hazardous solid wastes which need special handling and/or storage;
6) supervision of the ongoing operation of safe and effective hazardous solid waste management;
7) provision of workable answers to the residual wastes problems created by air and water pollution control facilities in removing and concentrating contaminants.

All of these objectives are considered continuing priorities for the next five years. The primary emphasis will be given to those activities which respond to legislative mandates. Secondary priorities will include public education and other problem preventive measures. In application, this means the elimination of promiscuous dumps and supervising the operation of replacement sanitary landfills will be given top priority.

The Recreational Sanitation Section is a multi-discipline environmental program. The Section provides supportive activities in public water supply, wastewater, and solid wastes management. The single purpose of this program is to ensure that Kansas will be able to enjoy popular outdoor recreation pursuits in a safe and healthful environment. Achieving this goal takes specific direction in the guidance and regulation of water supply, sewerage, and solid waste management aspects of recreational activities and development. The section has five specific program objectives:

1) Provide leadership in carrying out the reservoir sanitation zone program. Consultative support is given to local sanitation zone officers in handling private water supply and sewerage systems. The program directly handles public water supply and sewerage systems in cooperation with other appropriate bureaus in the Division of Environment.

2) Review public swimming pool plans to protect the public and to obtain eligibility for the constructing community to receive fifty percent federal funding.

3) Provide evaluations and recommendations and public and quasi-public recreational facilities (principally camps and swimming pools) on a request basis.

4) Regulate the single-family waste stabilization pond program with particular emphasis on initial construction.

5) Assist the Water Pollution Control Section, Division of Environment, in plan review for small quasi-public sewerage facilities such as those serving a mobile home park or a small commercial building.

Only objectives one and three apply specifically to solid waste management. Under objective one, the section conducts a review of subdivision plans in local reservoir sanitation zones. Prior to developing the subdivision, the contractor must secure the approval of the Recreation Sanitation Section. The Section reviews plans for compliance with solid wastes, wastewater, and water supply rules and regulations. The Section devotes an average of ten percent of its staff time to this activity. Under objective three, the section provides solid wastes, wastewater, and public water review for public and quasi-public recreational facilities. The Section devotes approximately five percent of its staff effort to this activity.

During the past five years, there have been several major changes in the Recreation Sanitation Section. One change has been in the decline in developmental activities in the reservoir sanitation zones. This, coupled with an improved working relationship with and increased competency of local sanitation zone officers, has resulted in a reduction in the section staffing.

B. Workforce Profile

The Solid Wastes Management Section of the Bureau of Environmental Sanitation is currently staffed with three professionals, three technicians, and one secretary. All the professionals have backgrounds and experience in sanitary engineering. The following table illustrates the distribution of professionals and technicians by occupational types.

TABLE XVII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Solid Waste Management Section
Current (1976) Staffing Level

Position		1976
Engineer		3
Technician		3
	TOTAL	6

During the last fiscal year the Section did not experience any growth, and there was turnover in only one position, an engineering technician. Turnover within the Section during the past few years has been minimal. The low turnover is attributed to improved departmental salary scales and adequate opportunity for internal promotion. New entrants are recruited through referrals from the Department of Health and Environment Employment Office, interviews at universities and colleges, and on a "walk-in" basis.

The Recreation Sanitation Section of the Bureau of Environmental Sanitation is currently staffed with two professionals: one sanitary engineer and one sanitarian. Less than fifteen percent of this section's time is allocated to solid wastes related activities; therefore, less than 0.4 person-year is allocated to solid wastes management activities. Turnover within this section is low, and during the past two years, there has been no turnover. The minimal turnover has been attributed to general instability of the Kansas economy and improved salaries. New entrants are recruited through the Department of Health and Environment Employment Office and colleges/universities, and the Section does interview persons on a "walk-in" basis, as appropriate. However, a major method of filling position vacancies has been internal promotion.

For purposes of examining the solid wastes related workforce profile within the state, the program has been divided into four categories: sanitary landfills, hazardous wastes, collection systems, and resource recovery programs.

There are 160 sanitary landfills in Kansas. The landfills are classified into three categories: industrial, municipal, and construction and demolition. There are 20 industrial sites, 30 construction and demolition sites, and 101 municipal sites. The municipal sites are evenly distributed throughout the state with an average of one per county. Nearly all municipal sites are publicly owned and operated. Approximately 75% of the landfills are one person operations. The larger municipalities, e.g., Topeka, Wichita, and Kansas City, have an average crew size of five persons per site. There are an estimated 180 equipment operators, 80 gate operators, 20 laborers, and 6 weighmasters employed at the municipal sites. (Scales are not required at landfills, however, six of the sites have elected to use scales.)

The number of landfill employees has experienced only minimal growth during the past year. Information available on the recruitment procedures and turnover rate for this category of solid waste is limited. However, since many of the landfill sites are operated by municipalities, many of the positions may be filled on a patronage basis. The turnover rate is estimated to be approximately 30% annually.

There are a reported 110 of the 500 promiscuous dumps remaining in the state. Most of these dumps are located along roadsides and are not officially owned, nor are they staffed.

There are currently no hazardous waste disposal sites in the state. All hazardous wastes are currently accommodated within the existing landfills. Consideration has been given to creating one landfill specifically for disposal of hazardous wastes during the next two years, and there is speculation that as many as four such sites may be developed during the next five years. Hazardous wastes control is currently adequate; however, it is anticipated that legislation will be introduced which will assist in creating these facilities. The state has experienced difficulty in interesting private firms and industries in developing hazardous wastes facilities due to cost.

There are approximately 242 collection systems in the state in addition to those serving the Kansas City area. The greater metropolitan Kansas City area was tabulated separately since a portion of those services provided to Kansas residents are supplied by Missouri based firms. There is a total of 54 collection systems based in both Kansas and Missouri which serve the merged Kansas City area. No information is available on the specific breakdown per state. In Kansas there are 182 privately operated systems, excluding those serving the Kansas City area, and 60 municipal systems. Most of the private systems are owned and operated by individuals and generally provide service to a limited locality; however, some municipalities contract for more than one city or county. The average crew size is 2.5 persons; there is no breakdown of the staffing of a crew by occupational types. Using the 2.5 persons/crew estimate, there would be approximately 605 persons involved in collection activities statewide excluding those firms serving the Kansas City area; there would be an additional 135 persons serving the Kansas City metropolitan area. No information is available on the turnover and recruitment activities for this category of solid waste.

There are no existing resource recovery programs within the state. The state does not license salvage operations, and there is no processing of municipal wastes. There may be some voluntary recycling programs for paper, glass and metal. However, no information is available on how many exist, where they are located, or the number of persons involved in the activity.

C. Workforce Projections

The Solid Waste Management Section of the Bureau of Environmental Sanitation will experience limited growth during the coming five years. By 1982 it is anticipated that the section will be staffed with six professionals and four technicians. The major growth, which is predicted for Fiscal Year 1980, is dependent upon the passage of federal legislation mandating more rigid control of solid wastes. Turnover in the technician category will average two percent annually. The overall average annual growth of the department is predicted to be six percent.

The Recreation Sanitation Section of the Bureau of Environmental Sanitation will experience some growth during the next five years; however, there will be little change in the number of person-years allocated to solid waste management activities. The level of commitment is expected to remain at approximately 0.4 person-years.

Workforce projections for the private sector are difficult to make. Estimates on the projected growth in the private sector was gathered through interviews with Kansas Department of Health and Environment representatives and with select municipal "public works" representatives. These representatives were not able to make estimates for each occupational type but rather made assessments for each solid waste category.

A minimal growth is expected in the workforce at sanitary landfills during the next five years. There will be an estimated growth of a maximum of five percent annually. If the hazardous wastes disposal sites are developed, there will be a new workforce created to operate these sites. It is possible that all four hazardous wastes disposal sites will be operational by 1980 with a crew of approximately five to six persons per site. There would be a state total of approximately 30 persons employed at these sites. The breakdown by profession is as follows: five professionals, ten equipment operators, five chemical operators, and ten laborers. The five professionals will be required to have a minimum of a B.S. degree in science. In addition, the employment of all five professionals will require approval by the state agency. Growth in the collection field will be extremely limited during the next five years. It is quite possible that there would even be a decrease in the number of persons employed in the field as those owner/operators who are making only marginal profit dropout of the system. Some growth is foreseen in the resource recovery field. Most of the growth will be concentrated in the energy conversion field, but estimates regarding the magnitude of the growth would be highly tenuous.

D. Training and Certification

Kansas offers both a voluntary training and certification program for sanitary landfill operators. The certification program was initiated in 1973. Two classes are offered per year. The classes vary in length, with the average length of one to two days/class. Approximately 60 persons are trained and certified each year. Most of those persons participating in the program are new entrants into the field. It is anticipated that the number of persons participating in the programs will gradually increase during the next five years, with a cumulative increase of 20-25%. There are an estimated 100 persons currently certified as landfill operators. Kansas Department of Health and Environment cooperates with the Kansas Technical Institute in Salina, Kansas in the organization and operation of the training programs.

No certification program is planned for the hazardous wastes employees. However, the state plans to provide ongoing technical assistance to each site.

No training or certification programs are currently offered for employees in the collection systems. Over three years ago training was conducted for collection workers, however, most of the materials contained in that course are now covered in the sanitary landfill operator training program.

The state has not developed plans for a training or certification program in resource recovery, and does not foresee the need for developing such a program during the next five years.

The Bureau of Environmental Sanitation encourages the staff members to participate in continuing education programming. Approximately four persons per year participate in educational programs. The courses average about three to five semester hours each. The Department offers a tuition reimbursement program for staff members who qualify.

Most on-the-job training is provided through information sharing with more experienced employees. All new job entrants are provided a short, formal orientation program.

E. Career Potential

Career prospects within the solid waste management field are relatively stable for the conventional sanitary landfill program. Little growth is expected during the next five years; a maximum of five percent per year is anticipated. Upgrade opportunities and career potential for sanitary landfill operators are generally considered to be limited. However, with the on-the-job training which they receive, most solid waste program employees are able to obtain higher paying jobs in related occupations such as heavy equipment operators in the construction industry. While there are no distinctly unique emerging occupations in this field, the existing landfill occupations may be altered to enable the landfills to accommodate other types of materials than those currently handled.

The career opportunities in the hazardous wastes field are extremely bright. If the four hazardous wastes disposal sites are opened within the state, approximately 30 persons will be hired to operate the programs. No hazardous waste program is currently operated within the state.

During the next five years the collection system program is not expected to grow significantly. Career opportunities for employees in the collection systems across the state are limited; however, an individual interested in organizing a system, can do so with a limited capital investment. There are no apparent emerging occupations in the collection field.

As a developing field, resource recovery offers a future potential for environmental occupations. While little information is available on the expected growth in the program during the next five years, the area of greatest focus will be in the energy conversion field.

The Bureau of Environmental Sanitation will experience only limited growth during the during the next five years. The Solid Wastes Management Section is expected to grow only by six percent. The growth will be directly attributable to improved federal legislation mandating more rigid control of solid wastes. There is no expected increase in the solid wastes activities offered through the Recreational Sanitation Section.

F. Conclusion

Four basic conclusions may be made following a review of the solid wastes workforce situation in Kansas:

1) Kansas will experience only a slight expansion in the workforce requirements for sanitary landfill operations and for collection systems;
2) The Solid Wastes Management Section anticipates more rigid federal regulations in solid wastes management which will impact the staffing of the section;
3) The Recreation Sanitation Section does not expect to expand its solid wastes management activities during the next five years;
4) Hazardous Wastes and Resource Recovery Programs will be emerging during the next five years; however, the state does not plan on developing any specialized training or certification program for either discipline.

During the past two years, the staffing levels of the solid waste management programs have stabilized. Any changes in the workforce profiles for either the public or private sectors will necessarily be a result of increased federal regulatory and enforcement requirements. Current fiscal constraints prohibit the State of Kansas from expanding solid wastes management activities.

In the recent past, the federal government has frequently taken the lead in defining general program priorities. Specifically, the

U.S. Environmental Protection Agency has provided supplemental funding to the Department of Health and Environment to assist them in coordinating and implementing program priorities. If new programs which address emerging environmental needs are to be implemented or expanded, the federal government must assist the State of Kansas in developing the programs by committing federal funds to the project.

VII. WASTEWATER

A. Introduction

The Bureau of Water Quality is the principal wastewater regulatory agency in the state. The basic responsibility of the Bureau is to protect surface waters and ground waters of the state from pollution sources of all types in order to provide suitable water quality for all beneficial uses. The Bureau is divided into three sections: The Water Pollution Control Section, the Oil Field and Environmental Geology Section, and the Water Quality Planning and Surveillance Section. The first two sections operate the regulatory programs of the Bureau related to treatment and disposal of wastewaters from municipal, industrial, and agricultural operations and protection of fresh ground water, and the third section operates the programs for water quality management planning and surveillance of ambient water quality throughout the state. Two new programs have been developed during the past two years as a result of Public Law 92-500, the Federal Water Pollution Control Act Amendments: the National Pollutant Discharge Elimination System, administered by the Water Pollution Control Section, and the Continuing Planning Process, operated by the Water Quality Planning and Surveillance Section.

The Water Pollution Control Section has responsibility for seven basic program functions:

1) Issuance of wastewater discharge permits for all municipal, industrial, agricultural, and commercial wastewater sources in the state, including determination of individual discharge conditions.

2) Processing of municipal applications for federal grant assistance for the construction of new or upgraded waste treatment facilities.

3) Review of wastewater treatment plant "plans of study" and "facilities plans" to determine consistency of local planning with state and federal requirements under Section 201 of P.L. 92-500.

4) Evaluation of existing and new feedlot sites for the purpose of assessing their pollution potential, and subsequent recommendations of type and sizing of facilities where needed.

5) Engineering review of plans and specification of new construction or expansion of municipal and industrial waste treatment facilities for conformance with state and federal requirements and to determine that the proposed construction and operation do not present a pollution hazard.

6) Provide continued surveillance of wastewater treatment facilities through regular appraisal. Major municipal and industrial dischargers are appraised and sampled annually.

7) Require regular flow measurement, sampling and analysis of influent and effluent conditions at wastewater treatment plants by the operators and submission of reports to the department.

The Oil Field and Environmental Geology Section implements all geologic and hydrologic aspects of water quality control. The pollution control functions administered by the Section include those related to oil and gas production, subsurface disposal of industrial wastes, underground storage of liquified petroleum gas, and solution mining wells operated by chemical and salt-producing industries. The section also prepares geologic and hydrologic evaluations for other program areas which cover subjects such as sanitary landfill, hazardous waste, and feed lot sites. The Section has five general program functions:

1) Review of applications for surface ponds, oil field and industrial waste disposal wells, repressuring wells, brine-supply wells and underground gas storage wells to determine that the construction and proposed operation do not present a pollution hazard.

2) License water well contractors in the state. Establish and enforce safe water well construction standards; require plugging of abandoned wells drilled in search of a water supply; and require identification of each water well drilled, including a record of well logs, well tests and water quality.

3) Surveillance of new and existing oil and gas production sites by on-site inspection of oil and gas lease operations.

4) Investigation of clean-up operations at oil and other hazardous materials spills.

5) Investigation and elimination of sources and potential sources of pollution related to oil and gas production such as earthen salt water ponds and waste storage pits that are pollution hazards, improperly constructed or operated brine disposal wells and repressuring wells, industrial waste disposal wells and brine supply wells; and old unplugged or improperly plugged holes that allow the escape of oil or brine.

The long-range goal of the Water Quality Planning and Surveillance Section is to benefit the environmental and resource management efforts of the state by providing for orderly development of water pollution control and abatement goals, determining priorities for distribution of construction grant funds, and investigating long-range water quality management alternatives in relation to state and water land resource constraints. The Section provides the division with seven basic program functions:

1) Preparation of river basin water quality management plans for each major river basin in the state which includes determination of projected wastewater treatment needs for all point sources based on population projections, river basin development, and existing and projected treatment capabilities; and development of statewide management programs with cost/benefit evaluations for non-point source pollution categories.

2) Coordination of area-wide waste management planning under Section 208 of P.L. 92-500 to assure consistency with state water quality basin planning for point source and non-point source control strategies developed under Section 303 (e) of P.L. 92-500.

3) Review of public health and water quality aspects of state and federal water resources development projects.

4) Operation of a state surveillance program for determining surface water quality. Expanded operations beginning in FY 76 include 110 water quality surveillance sections on streams, 150 chemical quality stations on lakes, 50 biological surveillance stations on streams, biennial biological surveys of 40 major lakes, and a new channel sediment and tissue analysis program.

5) In-depth evaluation of water quality conditions within discrete river basins by means of two-week intensive surveys during which all surface waters and all waste sources within the basin are sampled daily. At least five such basins are surveyed yearly.

6) Investigation of special natural or man-made pollution problems involving surface or groundwater, including establishment of special sampling stations or installations of continuously recording equipment.

7) Operation of a data processing program for computer storage and manipulation of data and information from the surveillance and monitoring programs, and NPDES permit program, and water pollution control and water supply facilities inventories.

B. Workforce Profile

The Bureau of Water Quality is staffed with a total of 76 professional and technical positions. Fifty of these positions are located in the headquarters in Topeka, and 26 are situated in district offices. The following table provides a breakdown of those positions located at headquarters by occupational types:

TABLE XVIII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Quality
(Headquarters)
Current (1976) Staffing Level

Position		1976
Engineer		24
Engineering Technician		15
Other		11
	TOTAL	50

The "Other" category includes three geologists, one administrator, one programmer, one business administrator, three biologists, one information specialist, and one artist.

As mentioned previously, the Bureau of Water Quality is divided into three sections. The following tables illustrate the breakdown of staffing according to program section and occupational type.

TABLE XIX

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Quality
Water Pollution Control Section
Current (1976) Staffing Level

Position		1976
Engineer		17
Engineering Technician		7
	TOTAL	24

TABLE XX

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Quality
Water Quality Planning and Surveillance Section
Current (1976) Staffing Level

Position	1976
Engineer	7
Programmer	1
Biologist	3
Engineering Technician	8
Information Specialist	1
Artist	1
TOTAL	21

TABLE XXI

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Quality
Oil Field and Environmental Geology Section
Current (1976) Staffing Level

Position	1976
Geologist	3
TOTAL	3

There are two categories of district offices under the Bureau of Water Quality: 1) Oil Field and Environmental Geology District Offices, and 2) General Data Collection and Surveillance Offices which serve both the water quality and potable water bureaus. There are six Oil Field District Offices which are staffed with a total of seven geologists and two engineering technicians. This staff allocates 100% of its time to water pollution control and abatement activities.

These offices report directly to the Oil Field and Environmental Geology Section Office at headquarters. The Water Quality/Potable Water District Offices are located in each of the six state planning districts. These offices are staffed with a total of six engineers and eleven engineering technicians. These positions allocate approximately 70% of their time to water pollution control activities.

The turnover rate for the Bureau varies according to section. Turnover in the Oil Field Section of the Bureau is minimal. Turnover for both the engineers and the engineering technicians staffing the Water Pollution Section ranges from 0-5%. Within the Water Quality Planning Section the turnover rate varies among the occupational categories. The engineers experience a turnover rate of approximately 15%; the engineering technicians average about about 10% annually; the remaining types, programmer, biologist, information specialist, and artist, average from 0-5% annually. Turnover in the district offices averages about 0-5% annually. The stability of the Bureau's turnover rate has been attributed to good management practices. When position vacancies occur they are filled through recruitment at some universities, and through advertising in newspapers and professional journals.

The Office of Laboratories and Research provides additional supportive services to the Bureau. The Water Chemistry Section of the Laboratory commits approximately 20% of its time to water pollution control or wastewater analysis. This amounts to 2.2 person-years of effort.

The multi-disciplinary approach of "208" Planning has expanded the involvement of state and local agencies in one aspect of environmental planning. Overall planning, coordination and timing is provided by an Executive Committee which consists of the Division of Environment, the Kansas Water Resources Board, and the Division of State Planning and Research. The multi-agency effort for statewide "208" concentrates on water quality management areas which include non-point source management, residual waste management, urban and industrial storm water management, and institutional assessment and management. The exact workforce contributions of the Water Resources Board and the Division of State Planning and Research for "208" Planning are difficult to assess. However, each agency did estimate the overall workforce contributions to environmental programming areas. The Division of State Planning and Research has three staff planners which allocate approximately 20% of their time for environmental policy review and interagency coordination. The Division provides supportive services to the State Conservation Commission, the Department of Agriculture, the Fish and Wildlife Reserve, the Water Resources Board, and the Department of Health and Environment. A portion of their current efforts has been devoted to assisting with coordination of the "208" Plans. Turnover for these positions average about one person per year, e.g., 33%. Position vacancies are filled through national advertising in professional journals and advertising in state and local newspapers.

The Water Resources Board is a multi-disciplinary board which devotes the major portion of its activities to water program planning. No specific information is available on the percentage breakdown of staff time allocated to either water supply or wastewater. One hundred percent of staff effort is allocated to development of state water plans, coordination of water activities, water data collection, and development of cooperative agency programs to achieve state water program goals. The Board is currently staffed with 22 positions. The Board has 25 authorized positions; however, three vacancies in the hydrologist category are currently being advertised, and interviews are being scheduled. There are 17 authorized professional, 3 technical and 5 clerical positions. The 17 professional positions include 13 hydrologists, 1 research assistant, 1 administrative assistant, 1 economist, and 1 illustrator. The hydrologists have backgrounds in engineering, geology, meterology, fish and wild life biology, and planning. The hydrologist generally has either a physical science or engineering background. The 3 technical positions are engineering technicians. The Board's turnover rate is approximately 4% annually. When vacancies occur, they are filled through the State Personnel Office.

The Kansas State Conservation Commission is also involved with "208" Planning. The Commission has representatives which serve on the "208" Technical Planning Council. In July 1976, the Conservation Commission added a full-time person to its staff to assist with "208" Planning. The person filling this position has a background in soil conservation. In addition, the Conservation Commission has a staff person who is on IPA loan; this position is also responsible for "208" Planning functions. (This staff position is a temporary and is funded for two to three years.) The local staff of the 105 Conservation Districts also allocate a small percentage of their staff time to "208" Planning; exact estimates of the amount of staff time is not available.

Four of the state's regional planning commissions are also involved in "208" Planning: Central Plains Tri-County in Wichita, MoKan Regional Planning in St. Joseph, North Central in Beloit, and Greater Southwest in Garden City. Most of these agencies have one full-time person involved in "208" Planning activities. These positions, as with other positions in the regional planning commissions, are totally dependent upon federal regulations and funding.

There are approximately 415 municipal wastewater and 360 industrial wastewater treatment plants in the state. Muncipal and industrial wastewater treatment plants are classified into four categories:

1) Class I: Any waste stabilization pond facility or any secondary treatment facility except an activated sludge type serving less than 1,000 persons.

2) Class II: Any activated sludge type facility serving less than 3,500 persons or any other secondary treatment facility serving 1,000 to 3,500 persons.

3) Class III: Any secondary treatment facility serving between 3,500 and 25,000 persons or any advanced or specialized wastewater treatment facility serving less than 5,000 persons.

4) Class IV: Any secondary treatment facility serving over 25,000 persons or any advanced or specialized wastewater treatment facility serving over 5,000 persons.

There are 256 Class I, 88 Class II, 57 Class III, and 14 Class IV municipal wastewater treatment facilities within the state. The 256 Class I municipal wastewater treatment plants frequently combine the water and wastewater operations. The plant is generally managed by one treatment operator. Turnover is minimal at Class I wastewater treatment facilities. Vacancies are filled locally by the mayor or city hall.

The 88 Class II municipal wastewater treatment facilities generally share staff with the water treatment operation. The average crew size is approximately three persons: one supervisor, one operator, and one maintenance person. Turnover within the plant is estimated at 0-5%, with most turnover resulting from retirement. Recruiting of applicants is accomplished through advertising in newspapers and trade journals.

The 57 Class III municipal plants are often combined with the water treatment operations. The average crew size for a Class III water treatment plant is approximately six. The crew is frequently composed of one supervisor, three operators, and two maintenance persons; however, this varies according to the needs of the particular plant. Turnover in the plants is minimal. Applicant recruitment is effected through advertising in newspapers and trade journals.

The staffing levels of the 14 Class IV municipal wastewater treatment plants range from ten persons up to sixty. The three largest Class IV wastewater treatment facilities were surveyed: Topeka, Wichita, and Kansas City. There are an average of 14 operators, 18 maintenance, and 28 laborers. Turnover for the upper level positions within Class IV plants generally averages 0-5%; turnover in lower level positions may range from 15-25%, depending on the locality.

Information on the classifications of the 360 industrial wastewater treatment facilities is not currently available. In addition, there is no information of the workforces staffing these facilities. Any estimates regarding the staffing of these facilities would be pure conjecture.

There are approximately 300-360 oil companies located in Kansas. Rough estimates are available on the number of persons employed in environmental capacities in these companies. Approximately 100 geologists, 150 petroleum engineers, 25 chemists, 50 attorneys, and 300 administrators are involved in petroleum-related environmental occupations. Information on turnover rate and recruitment procedures is not currently available for these positions.

C. Workforce Projections

Over the next five years, it is estimated that the Bureau of Water Quality staffing level will collectively increase by 11% annually in all professional positions, with the greatest growth in the engineering and engineering technician positions. This increase in staffing will be a direct result of increased demand for services and enforcement activities associated with P.L. 92:500 and P.L. 93-523. The following table depicts the growth of the Bureau (headquarters) by occupation title:

TABLE XXII

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

Bureau of Water Quality
(Headquarters)
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	24	28	30	32	34	36	8%	9%
Eng. Technician	15	19	26	27	28	29	8%	20%
Other	10	15	17	18	18	18	2%	13%
TOTAL	50	62	73	77	80	83	7%	11%

The increase in the "Other" category includes the following staff additions: two geologists in Fiscal Year 1977, one business manager in FY 1977 and a second one in FY 1978, one programmer in FY 1977 and a second in FY 1979, one biologist in FY 1979, and an information specialist in FY 1977.

All three sections of the Bureau will experience growth during the next five years. Two engineering technicians will be added to the Oil Field and Environmental Geology Section in FY 1978 for the operation of the underground injection control program. An additional engineering technician will be added to the Section in FY 1980 as the underground injection control program is expanded to include landfills, industrial ponds and sewage lagoons.

The Water Quality Planning and Surveillance Section will experience a significant increase in staff through 1981. Four engineering technicians, an information specialist, a biologist and two programmers will be added to the section. These increases will result from an effort to maintain and expand the "208" Planning programs and water quantity information bases. In addition, the Section will be expanding its water pollution abatement monitoring and enforcement activities. This expansion will require additional field sampling personnel by FY 1981.

The Water Pollution Section will also experience substantial growth. During the next five years, twelve engineers, ten engineering technicians, and two business-managers will be added to the Section. This increase is a consequence of the following five-year objectives which have been outlined by the Section:

1) Maintain and improve the system of permits currently in effect.
2) Maintain the quality of design and construction of water pollution control facilities in Kansas.
3) Provide additional staff for training personnel operating waste treatment plants.
4) Continue administration of the federal grant program to the maximum degree possible and seek additional responsibilities as they become available so as to better serve the citizens of Kansas.
5) Maintain a staff competent in the design of waste treatment facilities and a staff knowledgeable in the latest techniques of water pollution control.
6) Maintain a workforce capable of responding to any and all emergencies and catastrophic events wherein the health of the citizens of Kansas might be affected.

The staffing in the district offices will not experience any growth during the next five years. The Office of Laboratories and Research proposes to increase the staff effort which is allocated to water pollution control and wastewater analysis. The department which currently provides 2.2 person-years of supportive services will increase its contribution by approximately 3-4% annually. This total will increase from 3 to 3.5 person-years by 1981.

The Kansas Division of State Planning and Research does not anticipate any growth or decline in the amount of staff time allocated to wastewater activities during the next five years. The Water Resources Board, however, does expect to increase its staff by four positions over the next five years. An attorney and an accountant have been requested for 1979, and an additional hydrologist and engineering technician will be requested for 1979 or 1980. Increases in the Board will be a result of the expansion of existing programs. Kansas has experienced extreme dry conditions during the past two years. The Board expects to focus more staff effort on reorganization of water services and resources to meet the increased demand upon the existing resources. In addition, the Board anticipates more active involvement in "208" Planning activities during the next two to three years.

The State Conservation Commission expects growth in its "208" Planning staff during the next five years. The Commission estimates that six additional positions will be required by 1982 to assist with the coordination of "208" activities in the conservation districts. The six positions may include: one resource conservation specialist, one agricultural run-off pollution abatement specialist, one sediment control specialist, 0.5 administrators and 2.5 clerical.

The regional planning commissions were not able to speculate on future growth or development in their wastewater planning activities.

They indicated that any growth or decline in their activities would be directly related to federal project funding.

Growth within the private sector will most likely be limited to the Class IV municipal wastewater treatment facilities. The growth will generally be a result of expanded operations and service area. Some of the Class IV plants anticipate serving county-wide areas. No estimates are available on the percentage of annual increase in staffing levels. However, the largest impact would be upon lower-level laborer positions.

Any growth in Class III, II, or I facilities would be a result of increased federal regulations. One aspect of the municipal operations may be impacted as municipalities are required to test wastewater under the regulations of P.L. 92-500. However, most communities anticipate contacting these services to commercial laboratories. There are 30 such labs currently operating in the state. (The labs are currently staffed with approximately 10 persons each.) No information is available on the future growth in the staffing of these laboratories as a consequence of P.L. 92-500. Staff of the Class III, II, or I facilities were not aware of any other legislation which would impact the staffing of their facilities.

Little information is available on the industrial wastewater treatment facilities in Kansas; consequently, it is impossible to make projections concerning future growth in this area.

During the last year, the growth of oil companies operating in Kansas has leveled off. As crude oil prices increased, the incentive to expand exploration for new sources improved. Recently, exploration in Kansas has leveled off as crude oil prices have stabilized. Consequently, during the next five years the oil companies do not anticipate expanding their environmental component staffing levels.

D. Training and Certification

Kansas has offered a wastewater certification/training program since 1957. Approximately 400 of the estimated 800 operators are currently certified. In 1976, however, operator certification became mandatory. The program is offered jointly by the Kansas Board of Health and Environment and Kansas Community College System. During 1976, two programs were offered at each of the eighteen community colleges. The course is 22 weeks long with four hours of class work per week. The course emphasizes on-the-job training. A total of 70 persons were trained during 1976. It is anticipated that 70 additional persons will be trained each year through 1981. The classes combine registration of municipal and industrial wastewater treatment plant operators; as a result, there is no available information on the breakdown of either municipal or industrial operators.

In addition to the certification/training program, three district workshops are offered annually. The workshops provide instruction of a variety of current issues. They are usually one to two days in length. Approximately 280-285 persons are trained each year. The Board of Health and Environment estimates that enrollment in these workshops may increase to 290 by 1981.

During 1976, two NPDES Monitoring Workshops were held. Forty-four persons attended the program. The Board of Health anticipates offering two more workshops during 1977; an additional forty to fifty persons will be trained. From 1978 to 1982 these workshops will be continued on an as-need basis.

E. Career Potential

The career prospects for all levels of personnel involved in Water Pollution Control are strong. The state will be expanding its "208" Planning activities and its regulation and enforcement activities under P.L. 92-500. This expansion will result in a cumulative increase of 69% in the state headquarters of the Bureau of Water Quality. The greatest increase will be in the number of engineers and engineering technicians. The district offices of the Bureau will not experience any growth during the coming five years.

Two state agencies, the Conservation Commission and the Water Resources Board, will also experience growth as a result of "208" Planning activities. The positions which occur in these agencies will require a general background in engineering or physical or biological sciences.

The career potential for Class IV municipal wastewater treatment personnel is also very good. Growth in the Class IV facilities will be a result of increase in demand for services and expansion of service area to cover a county-wide system. Growth within Class I, II, and III will be very limited during the next five years. One section of P.L. 92-500 which may have an impact upon all classifications of facilities will be the water laboratory analysis requirement. Most municipal facilities have indicated the intention to contract for these services. This may have an impact upon the staffing of the 30 commercial laboratories located in the state; however, speculations on the degree of impact on the staffing of these laboratories is premature. Information on industrial wastewater treatment facilities and operations is sketchy; consequently, no projections can be made concerning career potential of the workforce.

The career potential for all occupations within both the private and public sector will depend largely upon federal, state, and local fiscal commitment.

F. Conclusion

During the next five years, the water pollution control workforce will experience a dramatic increase as the state responds to the demands of "208" Planning, P.L. 92-500 and P.L. 93-523. This rapid expansion will assert continuing demands upon the state training programs. Advanced training programs will be needed to educate engineers, geologists, and planners in the fundamentals of wastewater treatment. The vocational/technical schools will be asked to train more operators, supervisors, engineering technicians, and maintenance workers. The state certification program will need to be expanded to meet the increased demands for certified personnel. Due to the rapid growth, extensive coordination will be required. The training programs should be coordinated with the certification programs. Communication must flow between the state agency and the private sector to assure that the supply of personnel equals the demand, and that the personnel are trained with the skills necessary to function on the job.

The state and local governmental agencies will be called upon to respond to increased fiscal demands. If the private sector grows as predicted, the municipalities and state government will be required to commit increasing sums of money and resources. To assure that adequate finances are available as the demand emerges, the state agency might develop a long-range technical assistance planning program for municipalities to aid them in defining individualized municipal goals and organizing fiscal management programs to gain the requisite resources. Overall, the wastewater pollution control field is growing, and this growth is expected to continue through 1981 at an annual rate of 11% for the headquarters of the state lead agency. This growth is attributed to increased enforcement and compliance activities within the state.

In conclusion, it is evident that the growth patterns in the wastewater pollution control field are directly related to the requirements of federal legislation, i.e., P.L. 92-500 and "208" Planning. While there is no apparent emerging legislation in this field, any new legislation introduced during the next five years would certainly alter the workforce projections in that there would be a probable increase in all occupational levels in both the private and public sector.

VIII. ENERGY

A. Introduction

The State of Kansas has a designated energy office: Kansas State Energy Office. The Office administers a comprehensive energy planning program. The Office has been delegated six basic responsibilities:

1) energy conservation planning;
2) creating public awareness of the need for energy conservation and planning;
3) serve as a repository for energy related information of research and development;
4) serve as an energy data base;
5) organize and conduct the energy allocation program;
6) act as a federal and state liaison for energy related programs and policies.

During the last year, the Energy Office received a federal grant of $71,000 for development of a state energy conservation plan. The plan, which was submitted to the Federal Energy Administration regional office in March, 1977, sets out a series of program goals for conserving energy on a statewide basis. The plan which is still in its developmental stages concentrates upon energy conservation in three basic areas: industrial, agricultural and transportation energy usage. Energy conservation in the industrial sector will focus upon improving operational energy efficiency and performance of energy audits. Planning in the agricultural sector will concentrate upon improving and testing of conservation technology and dissemination of information concerning energy efficiency. The prime focus in the transportation program will be on urban planning and land use analysis.

Another major activity of the Energy Office has been to encourage energy research within the state. The office has recently surveyed the three major state universities in order to identify energy-related research currently underway at those institutions. The three institutions surveyed were Wichita State University, Kansas University (including the Kansas Geological Survey Office), and Kansas State University. Projects totaling $1.9 million were reported for the current fiscal year. Research expenditures of nearly $500,000 for oil and gas investigation were the single highest category of research. Other major research categories include: nuclear, $291,550; energy conservation, $273,146; solar, $166,756; biomass, $105,263; and general resource assessment, $180,500. Of the $1.9 million reported, slightly more than $1.0 million originated from external sources--primarily from agencies of the federal government and private companies. The remaining support came from state and university funds which have been allocated to energy research through direct appropriation by the legislature, general research funds at the universities and in-kind services. Information on specific projects is included as an appendix to this section of the report.

The Governor has created a Governor's Energy Commission. The Commission is chaired by State Senator Charles Angel. The Commission is responsible for designing and reviewing energy programs, priorities, and legislation. Kansas has been immediately concerned with developing energy conservation incentive programs. Kansas has an existing tax credit program for individuals or businesses installing solar heating units. Senator Angel indicated that immediate priorities for the state include: 1) reviewing the State Energy Conservation Plan, 2) developing legislation which encourages the exploration for and development of traditional energy sources in Kansas, in particular, gas and oil, and 3) developing conservation measures for state buildings which may include the installation of solar heating units when feasible. Another measure which was being considered by the legislature concerns the prohibition on construction of future nuclear power plants without the express consent of the legislature. This measure was defeated in February 1977.

The Attorney General's office has also been involved with energy programs in the state. Most recently, the Attorney General's office has been involved in litigation directed at preventing the construction of the Wolf Creek Nuclear Power Plant. The Wolf Creek Plant will be constructed as originally planned, and efforts by the Attorney General's office have been directed toward preventing construction of additional plants. The Consumer Protection Department of the Attorney General's office has been active in research concerning energy policies. Energy research by the department has revealed the following findings:

1) Kansas will approximately double its potential power resources by 1985;

2) public demand for utilities have experienced an annual increase of 2-4%. The power companies have projected an increased consumer demand averaging 5-6% annually;

3) three major corporations use the majority of the state's energy;

4) power plants are currently operating at only 49-50% of energy producing capacity.

Some communities within the state have been active in developing local energy planning and conservation programs. Wichita, for example, has developed an energy planning program. Under the energy planning program, specific plans were developed to provide for research regarding future energy needs and sources for the city as well as providing information for sound energy planning and management in the future. These activities were mandated by the need to prepare a comprehensive community development plan and policy management capacity, to determine needs, set long- and short-term goals, and to devise similar applicable programs to meet these goals.

Four interim programs were developed. The four programs are: Home Insulation Pilot Project, Public Awareness Program, City Test Facility, and Alternative Energy Investigations. The Home Insulation Program provides for no-interest loans, with full pay-back, monitored and managed by the Department of Economic Development. The program is designed to retrofit approximately 750 homes with attic insulation. All Wichita homeowners are eligible with the rate of pay-back commensurate with the 1975 incomes. Under the Test Facility Program a standard Wichita resident has been secured to evaluate energy-saving devices, determine the effectiveness of various retrofitting measures, and collection of data to substantiate and/or to refute certain claims for materials and devices now available to the Wichita public.

Also, the program has been designed to provide homeowners with viable data concerning the reliability of selected procedures and/or innovated changes or additions which may be made concerning energy consumption and losses associated with furnaces and air conditioners. The Public Awareness Program has received the highest distribution and the greatest reception, since it has provided vehicles to acquaint Wichita citizens with specific methods for low cost retrofitting and energy conservation in local dwelling units. The Alternative Energy Investigations was developed to determine which avenues of alternative fuels must be taken to preserve the industrial and economic integrity of Wichita.

B. Workforce Profile

The Kansas State Energy Office is currently staffed with five full-time persons: one program director, two assistant directors, one fuel allocation specialist, and one secretary. Each assistant director has specialized program responsibility in addition to general management duties. One assistant director is responsible for the energy allocation program, and the other assistant director is in charge of resource development. Since the program was developed in 1975 there has been no turnover in the staff. Position vacancies are filled through national advertising.

The Attorney General's office employs one full-time attorney who has responsibility for energy-related programs and litigation. The program was developed during the last year and a half. There has been no turnover in this position during the last year. New positions are filled through the application process; applications are accepted from only those persons with a background in law.

The Wichita Department of Economic Development is responsible for the energy planning program. The office employs three persons who are involved with energy/environmental planning activities: one energy coordinator, one person who monitors research in the test facility, and one secretary. There are two additional persons that are involved with auxiliary energy/environmental planning: one industrial analyst and one secretary. Ninety percent of their time is devoted to analysis of home consumption of energy. Information on other cities involved in energy planning is not available; consequently, no further information is available on the number of persons involved in energy planning in municipalities.

The in-state workforce projections for the energy field are difficult to assess. Most utility companies in the state have environmental components. The utility companies generally have two types of environmental programs: air and wastewater. The workforce projections for the utility companies have been merged with the projections of private industry within the air and wastewater sections of this report.

C. Workforce Projections

During the next five years, the State Energy Office is not predicting any growth. If state and federal funding is not continued at the same level, the office may experience a decrease in staffing. No further predictions can be made regarding the future staffing level of this office.

The Attorney General's office may experience some increase in staffing in the next five years. One or more attorneys may be added to the staff as necessary. Any addition in staffing will be a direct result of increased consumer interest in energy policies and programs or increased energy-related litigation.

The Wichita Department of Economic Development proposes to expand its program to include more research on alternative energy sources. The department anticipates that any expansion in this area may increase staffing in its department by about 25%, e.g., one person.

Plans are being developed for the construction of the Wolf Creek Nuclear Power Plant. The plant which is scheduled for completion in 1983 will be located at the John Redman Reservoir in Burlington. The plant will produce 1150 megawatts of power. When the plant is opened in 1983, it will be staffed with approximately 120 employees. No exact breakdown is yet available on the staffing of the plant; however, available positions will include engineers, instrument technicians, health physicists, health physics technicians, quality control specialists, electrical and mechanical maintenance workers, biologists, chemists, and clerk/typists. A supporting staff of administrative environmentalists will be provided through the Kansas Gas and Electric Central Office. A major portion of the staff will be involved in environmental quality control.

According to the Kansas Bureau of Radiation Control, one program which will be addressed prior to operation of the Wolf Creek Plant is what methods can be used to dispose of high level radioactive wastes.

The low level wastes include those items such as filters, tools and maintenance materials which have been contaminated. The high level wastes are the fuel rods from the nuclear reactors. The low level wastes will be shipped to commercial dumps by truck or rail in specifically designed packages. The manner of shipping will be determined in accordance with the Department of Transportation guidelines. The high level wastes present a unique problem. Currently there are no sites where these materials can be shipped to be remanufactured. Under normal circumstances they would be shipped back to the source of purchase.

D. Training and Certification

There are no certification programs either currently operational or planned for personnel in energy-related environmental fields. Those persons who will be employed in the nuclear power plants will be recruited through a variety of sources: in-house transfers or promotions, colleges and universities with related programs, and through professional journals. Other than general biology, chemistry and engineering programs, colleges and universities have limited programs in energy/environmental fields.

E. Career Potential

With the limited availability of information concerning these programs, it is impractical to offer trends for career potentials in the energy conservation and conversion field. However, giving consideration to the emerging national energy shortage, it is reasonable to speculate that while employment opportunities may be declining in the traditional energy programs, there may be a considerable increase in the demand for all personnel levels with experience in nuclear energy. The extent of this demand will be correlated to the accessibility of radioactive materials to power the plants.

F. Conclusion

Kansas has been actively pursuing internal solutions to the emerging energy crisis. The three major state universities, Kansas State University, Kansas University, and Wichita State, are operating $1.9 million in energy research projects. Research is being conducted on a cross section of alternative energy sources: oil and gas, nuclear, coal, solar, wind, biomass, conservation, data and forecasting, resource assessment and other miscellaneous topics.

The Kansas State Legislature has also been responsive to the need for developing energy conservation and exploration programs. Kansas has implemented a tax credit program for individuals and businesses installing solar heating units. During this legislative session and during future sessions the state legislature will continue to review possible measures which can be instituted to curtail a possible state energy emergency.

The State Energy Office has developed a comprehensive energy program. However, lack of funds has prohibited the office from developing the programs as fully as possible. The State Energy Office is not optimistic about the possibility of raising the funds required to implement the programs as completely as it believes necessary.

Employment opportunities in the energy/environmental field in the state appear to have stabilized. However, if the utility companies are successful in completing all proposed construction, the energy generating capacity of the state will have doubled by 1985. This growth in operation will certainly have a significant impact upon all levels of employment opportunities within the energy/environmental disciplines. No exact projections can be made on the total impact on the related workforce. However, the proposed Wolf Creek Nuclear Plant will employ an additional 120 persons in a variety of occupations.

In conclusion, it is anticipated that all energy related occupations in Kansas will experience considerable growth during the next five to ten years.

Selected Post Secondary Institutions With Formal Environmental Energy Programs

EDUCATION

The educational institutions within the State of Kansas generally offer fundamental courses in ecology, man and his natural environment, and environmental biology; however, few comprehensive environmental programs are available. Two institutions within the state have operational environmental majors: Ottawa University and University of Kansas.

The University of Kansas has two basic programs: Environmental Health Engineering and Environmental Studies. The Environmental Studies program is an undergraduate degree. The programs emphasizes a diverse science orientation with technical training in environmental pollution control.

The Environmental Health Engineering program is an advanced degree program; Master of Science and Doctor of Philosophy degrees are awarded through the program. The advanced degree programs combine courses available through the Civil Engineering program with especially designed courses in various aspects of pollution control.

Both the Environmental Health Engineering and the Environmental Studies programs have been included in detail in the Senior Institution Section of this report.

Ottawa Univerity has enrolled its first class of students in three environmental concentrations. The program which was formally initiated in 1976-77 offers three areas of concentration: Interpretive Ecology, Research Ecology, and Environmental Resource Management. The University also operates a Environmental Institute. The Institute seeks to coordinate a variety of environmental concerns.

Ottawa University
Ottawa, Kansas

Program: Environmental Studies (B.S.)

Hours required for major: The university does not categorize courses by hours; it uses a program of depth studies. Each student is required to plan a depth study program in the major area of concentration usually involving from six to ten courses.
Program Inception: 1976
Staff Size: Six professors, one associate professor, one assistant professor (8 Ph.D.s)
Enrollment: Information not currently available
Graduates (1976): 0
Placement: 0
Graduate Work: 0

Program - Interpretive Ecology

Courses

Topics in Environmental Studies
General Botany
General Zoology
Ecology
Taxonomic Botany
Principles of Chemistry
College Chemistry
College Physics
Internship in Interpretive Ecology

Program - Research Ecology

Courses

General Botany
General Zoology
Microbiology
Ecology
University Physics
Chemistry Analysis
Computer Programming
Independent Research Participation

Program - Resource Management

Courses

Topics in Environmental Studies
General Chemistry
Power Systems and the Environment
Public Finance
Management Fundamentals
Public Policy
Internship in Resource Management

University of Kansas
Lawrence, Kansas

Program: Environmental Health Engineering (M.S., Ph.D.)

Hours required for major: Semester (M.S.) 30 with thesis, 33 without thesis, (Ph.D.) 72
Program Inception: (M.S.) 1961, (Ph.D.) 1964
Staff Size: Two professors, two assistant professors, one graduate assistant (4 Ph.D., 1 M.S.)
Enrollment: (M.S.) 21, (Ph.D.) 6
Graduates (1976): (M.S.) 9, (Ph.D.) 2
Placement: (M.S.) 4 (Ph.D.) 2
Graduate Work: (Ph.D.) 4

Courses

Introduction to Civil Engineering
Statics
Statics for Architects
Surveying
Dynamics
Statics and Dynamics
Strength of Materials
Strength of Materials for Architects
Fluid Mechanics
Civil Engineering Materials
Hydrology
Structural Analysis
Environmental Pollution Control
Transportation Engineering Fundamentals
Soil Mechanics
Special Problems
Seminar
Construction Costs and Methods
Engineering Contracts
Water Resources Engineering Design
Structural Design
Water Supply and Sewerage
Highway Engineering
Foundation Engineering
Introduction to Fracture Mechanics
Civil Engineering Project Planning
Dynamics and Vibrations
Structural Mechanics
Experimental Stress Analysis
Intermediate Fluid Mechanics
Experimental Fluid Mechanics
Water Resources Policy and Administration
Applied Hydrology

Free Surface Flow I
Advanced Structural Analysis I
Advanced Concrete Design I
Advanced Concrete Design II
Advanced Steel Design I
Advanced Steel Design II
Sanitary Chemistry I
Sanitary Chemistry Laboratory I
Sanitary Engineering Design
Applied Water Microbiology
Air Pollution
Marine Pollution
Water Quality
Industrial Water and Wastes
Traffic Engineering I: Characteristics and Studies
Airport Planning and Design
Aerial Photographic Interpretations of Soils
Engineering Properties of Soils
Advanced Soil Mechanics
Soils Engineering Laboratory
Energy Methods
Theory of Elastic Stability
Advanced Fracture Mechanics
Advanced Fluid Mechanics I
Management of Urban Environmental Systems
Application of Optimization Techniques in Civil Engineering
Water Resources Literature Seminar
Water Resources Research Seminar
Water Resources Engineering
Quantitative Ground Water Hydrology
Free Surface Flow II
Advanced Structural Analysis II
Structural Design for Dynamic Loads
Plates and Shells
Physical and Chemical Treatment Processes I
Physical and Chemical Processes II
Environmental Health Engineering Administration
Solid Waste Disposal
Biological Waste Treatment Systems
Environmental Health Literature
Environmental Health Research Seminar
Traffic Engineering II: Operations and Control
Geometric Design of Traffic Facilities
Urban Transportation Planning
Principles of Pavement Design
Engineering Rock Mechanics
Earth Structures
Foundations
Advanced Special Problems

Special Problems in Mechanics
Structural Engineering and Mechanics Seminar
Thesis
Dynamics and Vibrations II
Theory of Plasticity
Solution Methods in Mechanics
Advanced Mechanics
Selected Topics in Solid Mechanics
Advanced Fluid Mechanics II
Radiological Waste Treatment
Sanitary Chemistry II
Advanced Topics in Environmental Health
Research
Ph.D. Thesis

Program: Environmental Studies (B.A.)

Hours required for major: Semester 41
Program Inception: 1974
Staff Size: Interdisciplinary department with 40 professors contributing to the program.
Enrollment: 100
Graduates (1976): 15
Placement: 15
Graduate Work: 0

Courses

Principles of Biology
Introduction to Environmental Studies
Environmental Law
Seminar in Environmental Studies
Field Work in Environmental Studies
Community and Ecosystem Ecology
Chemistry
Statistics
Environment and Man
Environmental Geology
Geophysics and Geochemistry of Pollution Systems
History of Urban Planning
Urban and Regional Planning
Problems of City and Regional Planning
Urban Botany
History of Earth's Vegetation and Its Relevance to Man
Plants and Man
Plant Ecology
Principles of Ecology
Comparative Animal Physiology
Advanced Population Biology
Quantitative Methods

Legal Aspects of Business
Environmental Chemistry
Environmental Pollution Control
Hydrology
Sanitary Chemistry
Applied Water Microbiology
Marine Pollution
Water Resources Policy and Administration
Environmental Health Engineering Administration
Introduction to Computing
The Economics of Social and Environmental Problems
Land Economics
Resource Economics
Physical Geography
Foundations of Biogeography
Geography of Population
Cultural Ecology
Geology and Man
History of the Earth
Geology and Contemporary Society
Geophysics and Geochemistry of Pollution Streams
Introduction to Oceanography
Remote Sensing
Unusual and Man-Made Weather
Microclimatology
Water Resources Meteorology
Special Problems in Meteorology
Air Pollution Meteorology
Man and Microbes
Environmental Physics
Introduction to Ecological Psychology
Radiation, Environment, and Man
Theory and Methods in Human Ecology

State Legislation

KANSAS PESTICIDES

TITLE:

Agricultural Chemical (Economic Poison) Act
Kansas Statutes

PURPOSE:

To provide authority for the control, distribution and labeling of pesticides in the state.

DEFINITIONS:

1. Agricultural chemical
2. Insecticide
3. Fungicide
4. Rodenticide
5. Herbicide
6. Nematocide
7. Defoliant
8. Plant regulator
9. Desiccant
10. Insect
11. Fungi
12. Weed
13. Nematode
14. Fumigant
15. Ingredient statement
16. Active ingredient
17. Inert ingredient
18. Antidote
19. Person
20. Secretary
21. Registrant
22. Label
23. Labeling
24. Adulterated
25. Misbranded

ADMINISTERING AUTHORITY:

Board of Agriculture

AUTHORIZATIONS:

To register all pesticides;
To control registration and pesticides through quality checks and cancellations;
To issue regulations pursuant to the act, particularly relating to pests and classification of pesticides;
To seize pesticides in violation of the act.

PROHIBITED ACTS:

To distribute, transport or sell unregistered pesticides or pesticides not conforming to label, or misbranded or adulterated;
To detach, destroy or deface any pesticide label;
To fail to comply with other rules and act provisions.

EXEMPTIONS:

Certain transporters, public officials; pharmacists; items consigned for export.

PENALTIES:

Fines of from $100 to $500.

KANSAS PESTICIDES

TITLE:

Kansas Pesticide Law (effective October 1977)
Kansas Statutes

PURPOSE:

To provide for a system of pesticide registration, recordkeeping and to undertake a pesticide applicator certification program.

DEFINITIONS:

1. Advisory board
2. Animal
3. Board
4. Certified applicator
5. Certified commercial applicator
6. Certified private applicator
7. Defoliant
8. Desiccant
9. Equipment
10. Fungus
11. General use pesticide
12. Insect
13. Nematode
14. Person
15. Pest
16. Pesticide
17. Pesticide business
18. Plant regulator
19. Restricted use pesticide
20. Secretary
21. Under supervision of
22. Weed

ADMINISTERING AUTHORITY:

Board of Agriculture
Pesticide Advisory Board

AUTHORIZATIONS:

To license pesticide businesses;
To classify pesticides for general or restricted use;
To register government agencies for application;
To issue commercial and private applicator certificates;
To register commercial applicator equipment;
To enter and inspect property to enforce the act;
To issue regulations pursuant to the act.

CERTIFICATION OR LICENSING:

All private and commercial applicators must be certified. Commercial applicators to be examined on knowledge and use of pesticides and according to ten categories of expertise.

PROHIBITED ACTS:

To use restricted use pesticides without proper certification;
To use pesticides contrary to label;
To fail to keep required records;
To engage in pesticide business without proper license.

EXEMPTIONS:

Public personnel researchers; veterinarians and physicians; private use on own premises.

PENALTIES:

General violations are misdemeanor;
Private applicator violation - fine of from $100 to $500.

KANSAS WASTE WATER

TITLE:

Certification of Operators Law
Kansas Statutes 65-4501

PURPOSE:

To provide for a system of operator certification to ensure the proper maintenance of water supply systems and waste water treatment facilities.

DEFINITIONS:

1. Department
2. Secretary
3. Person
4. Water supply system
5. Waste water treatment facility
6. Operator
7. Certificate

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To establish operator qualifications and a certification system;
To classify water supplies and treatment facilities;
To issue regulations pursuant to the act.

CERTIFICATION OR LICENSING:

All operators of water supply systems and waste water treatment facilities are required to be certified in a classification corresponding to the system or facility classification. Done by examination.

PROHIBITED ACTS:

To operate a system or facility without proper certification.

PENALTIES:

Fines of up to $500.

KANSAS RADIATION

TITLE:

Nuclear Energy Development and Radiation Control Act
Kansas Statutes 48-1601

PURPOSE:

To provide for a program of regulation of radiation sources, to promote orderly regulation with the federal government, and to permit maximum utilization of radiation sources all consistent with public health and welfare.

DEFINITIONS:

1. Nuclear energy
2. Electronic product
3. Electronic product radiation
4. By-product material
5. Source material
6. Special nuclear material
7. Radiation
8. License - general and specific
9. Registration
10. Person
11. Board

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To conduct studies concerning potential new legislation regarding nuclear development;
To disseminate information concerning radiation control;
To provide for licensing and registration of various nuclear or radioactive materials;
To issue regulations pertaining to radiation sources;
To enter and inspect property to enforce the act;
To impound sources of radiation.

CERTIFICATION OR LICENSING:

General and specific licenses shall be issued for by-product, source, or special nuclear materials.

PROHIBITED ACTS:

To fail to maintain records of radiation sources;
To use, manufacture, transport or possess radiation sources without proper license.

EXEMPTIONS:

Authority is granted to exempt certain radiation sources if no danger to public health and safety.

PENALTIES:

Violations constitute misdemeanor; fines of from $25 to $500.

NRC AGREEMENT STATE: Yes

KANSAS POTABLE WATER

TITLE:

Public Water Supplies Law
Kansas Statutes 65-163

PURPOSE:

To provide authority to ensure the safety and purity of Kansas public water supplies.

DEFINITIONS:

1. Waters of the state
2. Person

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To issue permits for the construction waterworks systems;
To have general supervisory authority over state drinking water quality;
To issue regulations and orders as necessary to ensure the sanitary quality of drinking water;
To establish standards for construction and operation of waterworks systems;
To enter and inspect property in enforcement of the act.

CERTIFICATION OR LICENSING:

Permits required for construction or modification of waterworks facilities.

PROHIBITED ACTS:

To construct facilities without a proper permit;
To violate orders of the Department;
To establish or maintain cross-connection without a permit;
To establish water sample analysis standards.

PENALTIES:

Fines of from $50 to $500.

KANSAS WASTE WATER

TITLE:

Water Supply and Sewage Law
Kansas Statutes 65-161

PURPOSE:

To provide for the control of water pollution through a pollutant discharge permit system.

DEFINITIONS:

1. Waters of the state
2. Person

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To investigate water pollution of the state and issue orders to halt such pollution;
To issue permits concerning pollutant discharges;
To issue regulations pursuant to the act, including a permit fee schedule;
To prevent surface and subsurface water and soil pollution of all types;
To develop standards for sanitary water and sewage systems.

CERTIFICATION OR LICENSING:

All sewer systems or sources of discharge must have a permit relating to treatment, amounts and types of discharge.

PROHIBITED ACTS:

To fail to obtain the proper permit;
To discharge pollutants contrary to a permit;
To violate pollution abatement orders issued by the Department;
To discharge any mercury into waters of the state.

EXEMPTIONS:

Sewage systems in operation prior to 1907.

PENALTIES:

Discharge violations - fines from $2,500 to $25,000.
Reporting violations - fines of from $50 to $500.
Civil penalties of up to $10,000.
Other violations - fines of from $25 to $10,000.

KANSAS AIR

TITLE:

Air Quality Control Act
Kansas Statutes 65-3001

PURPOSE:

To provide for a coordinated statewide program of air pollution prevention, abatement and control among state, local and regional jurisdictions.

DEFINITIONS:

1. Air contaminant
2. Air contamination
3. Air pollution
4. Emission
5. Person
6. Department
7. Commission
8. Board
9. Secretary
10. Engineer

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To administer the act, including issuing of regulations;
To develop state air plan;
To undertake studies and investigations relating to air pollution;
To establish ambient air quality standards;
To assist local agencies in pollution control efforts;
To cooperate with federal agencies in funding and related matters;
To issue permits to new air pollution sources;
To establish emission control limitations.

PROHIBITED ACTS:

To violate emissions limitations;
To operate a facility without the required permit;
To fail to submit proper records and reports.

EXEMPTIONS:

Air contamination within a plant or as relates solely to industrial health and safety.

PENALTIES:

Fines of up to $1,000.

KANSAS SOLID WASTE

TITLE:

Solid Waste Management Act
Kansas Statutes 65-3401

PURPOSE:

To establish and maintain a cooperative state and local program of planning and technical and financial assistance for comprehensive solid waste management.

DEFINITIONS:

1. Solid waste
2. Solid waste management system
3. Solid waste processing facility
4. Solid waste disposal area
5. Person
6. Waters of the state
7. Secretary

ADMINISTERING AUTHORITY:

Department of Health and Environment

AUTHORIZATIONS:

To issue regulations pursuant to the act and develop a plan of financing solid waste systems;
To provide approval and assistance for local solid waste management plans;
To develop statewide solid waste plan;
To issue permits for solid waste management systems;
To administer a 50%-of-cost grant program for solid waste systems.

CERTIFICATION OR LICENSING:

All solid waste processing facilities must have permit for operation.

PROHIBITED ACTS:

To operate a facility without proper permit;
To engage in open dumping;
To engage in solid waste burning;
To interfere with enforcement of the act.

Appendix

KANSAS ENERGY RESEARCH PROJECTS

PREPARED BY

KANSAS STATE ENERGY OFFICE

RESEARCH CATEGORY: ·SUMMARY - FY 1977 PROJECTS

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
OIL AND GAS		$321,652	$ 172,586	$ 494,238
NUCLEAR		19,414	272,136	291,550
CONSERVATION		85,607	187,539	273,146
COAL		45,312	50,724	96,036
SOLAR		16,414	150,342	166,756
WIND		53,128	17,130	70,258
BIOMASS		23,810	81,453	105,263
DATA & FORECASTING		61,850	-	61,850
RESOURCE ASSESSMENT (general)		160,500	20,000	180,500
MISCELLANEOUS		42,981	132,913	175,894
TOTALS		$830,668	$1,084,823	$1,915,491

RESEARCH CATEGORY: BIOMASS

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Use of Crop Residue, Feedlot Wastes and Municipal Wastes to Support a Municipal Electric Utility; directors, N. D. Eckhoff and W. H. Johnson	KSU/KU	$ 4,390	$31,453 / Ozarks Regional Comm.	$ 35,843
· Feasibility Study of the Use of Wood-Fuel to Supplement the Solid Waste-Steam Generator System at the University of Kansas in Lawrence; director, G. G. Naughton	KSU/KU	$12,500 KSU 6,920 KU	$50,000 / Ozarks Regional Comm.	$ 69,420
CATEGORY TOTALS		$23,810	$81,453	$105,263

RESEARCH CATEGORY: CONSERVATION

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Development of a State Energy Conservation Plan for the State of Kansas; directors, D. E. Rathbone and N. D. Eckhoff	KSU	$31,387	$ 65,287 / FEA through the Kansas Energy Office	$ 96,674
· An Investigation of Drag Reduction for Tractor-Trailer Vehicles; director, V. Muirhead	KU	$ 831	$ 9,052 / NASA	$ 9,883
· Analysis of Pressure Excursions During Transient Film Boiling From a Sphere to a Saturated Liquid; relating to boiler inefficiencies; director, L. Burmeister	KU	$ 882	$ 28,200 / NSF	$ 29,082
· Agricultural Fuel Conservation; director, S. J. Clark	KSU	$52,507	$ 85,000 / FEA	$137,507
CATEGORY TOTALS		$85,607	$187,539	$273,146

RESEARCH CATEGORY: COAL

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Evaluation of Kansas Coal Reserves; director, L. L. Brady	(KU) KGS	$35,000	-	$35,000
· Coal Liquification; director, L. T. Fan	KSU	-	$15,000 / Phillips Petroleum Co.	$15,000
· Northern Natural Gas Co. Energy Research Fellowships; relating to combustion characteristics of powdered coal; director, T. W. Lester	KSU	-	$11,583 / Northern Natural Gas	$11,583
· Analysis and Synthesis of Solids Mixing and Demixing Systems; relating to blending of low and high sulfur coal; director, L. T. Fan	KSU	$ 6,829	$24,141 / NSF	$30,970
· The Role of Coal in Soviet Energy Policy Planning; director, L. Dienes	KU	$ 3,483	-	$ 3,483
CATEGORY TOTALS		$45,312	$50,724	$96,036

RESEARCH CATEGORY: ENERGY DATA / FORECASTING

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Energy Data Base and Analysis; director, R. G. Hardy	(KU) KGS	$58,000	-	$58,000
· Application of Modern Estimation Techniques to Electric Energy Forecasting Problems; director, R. Klein	KU	$ 3,850	-	$ 3,850
CATEGORY TOTALS		$61,850	-	$61,850

RESEARCH CATEGORY: MISCELLANEOUS

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Hydrogen Fuel Research; directors, F. W. Harris and G. L. Johnson	KSU	$14,099	-	$ 14,099
· Regional Tectonics and Seismicity (relating to siting of the Wolf Creek Nuclear Plant); director, F. W. Wilson	(KU) KGS	$28,882	$120,433 / Nuclear Regulatory Comm.	$149,315
· Undergraduate Research Participation (relating to energy-related chemical problems); director, Kristin Bowman	KU	-	$ 12,480 / NSF	$ 12,480
· Summer Workshops on Electrical Power Production; director, J. K. Shultis	KSU	-	$ 10,000 / ERDA	$ 10,000
· Energy Lecture Series; director, N. D. Eckhoff	KSU	-	$ 25,000 / KGE & KCPL	$ 25,000
CATEGORY TOTALS		$42,981	$167,913	$210,894

RESEARCH CATEGORY: NUCLEAR

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Educational Modules Development for the "Back-End" of the Nuclear Fuel Cycle; director, N. D. Eckhoff	KSU	$ 8,838	$ 63,914 / ERDA	$ 72,752
· Educational Modules Development for the Nuclear Fuel Cycle; director, N. D. Eckhoff	KSU	$ 7,576	$116,882 / NSF	$124,458
· Fast Neutron Transmission Measurements and Analysis for Important Reactor Core and Shielding Materials; directors, J. K. Shultis and J. O. Mingle	KSU	-	$ 3,440 / NSF	$ 3,440
· Resource and Radioactivity Survey in Antarctica by Airborne Gamma-Ray Spectometry; director, E. Zeller	KU	-	$ 53,900 / NSF	$ 53,900
· A Study of Methods for Estimating Parameters of Probability Distributions from Multi-Plant Component Failure Data; directors, F. Tillman and J. K. Shultis	KSU	$ 3,000 (est)	$ 30,000 / Nuclear Regulatory Comm.	$ 33,000
· Reactor - Sharing (with other universities); director, N. D. Eckhoff	KSU	-	$ 4,000 / ERDA	$ 4,000
Category Totals		$19,414	$272,136	$291,550

RESEARCH CATEGORY: · OIL & NATURAL GAS

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Tertiary Oil Recovery Project; directors, D. Green and P. Willhite	KU	$220,453	$ 42,500 (approx.) NSF, HEW, Phillips Petro.	$262,953
· Tertiary Oil Recovery Project-Support; director, W. J. Ebanks	(KU) KGS	$ 18,000	-	$ 18,000
· A Cooperative Research Program Involving the Mexican Petroleum Institute and the Department of Chemical and Petroleum Engineering at the University of Kansas; directors, F. Kurata and G. Swift	KU	$ 10,537	$ 20,700 / NSF	$ 31,237
· Development and Evaluation of Well Testing Procedures for Layered Gas Reservoirs; directors K. Bishop and G. Swift	KU	-	$ 12,000 / Marathon Oil Company	$ 12,000
· Evaluation of Subsurface Heavy Oil and Tar Sands in Southeastern Kansas; director, W. Ebanks	(KU) KGS	$ 33,662	$ 97,386 ERDA	$131,048
· Exploration Potential and Subsurface Geology of Cherokee Group, Western Kansas; director, R. L. Dilts	(KU) KGS	$ 4,000	-	$ 4,000
· Exploration Guides for Deep Petroleum and Natural Gas Reservoirs; director, W. J. Ebanks	(KU) KGS	$ 35,000	-	$ 35,000
CATEGORY TOTALS		$321,652	$172,586	$494,238

RESEARCH CATEGORY: RESOURCE ASSESSMENT (general)

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Automated Resource Evaluation System (ARES); director, J. C. Davis	(KU) KGS	$ 75,000	-	$ 75,000
· Airborne Magnetometer Studies; director, H. L. Yarger	(KU) KGS	$ 58,500	$20,000 (Nuclear Regulatory Commission)	$ 78,500
· Automated Subsurface Stratigraphic Mapping; director, W. J. Ebanks	(KU) KGS	$ 27,000	-	$ 27,000
CATEGORY TOTALS		$160,500	$20,000	$180,500

RESEARCH CATEGORY: SOLAR

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Solar Insolation Measurement (Wichita); director, A. R. Grahm	WSU	$10,069	-	$ 10,069
· Research on a Portable Solar Energy Collector Test Unit; director, K. Lenzen	KU	$ 2,035	$ 21,310 / NASA	$ 23,345
· Unsteady Behavior of a Solar Pond Incorporating Downward Convection; director, L. Burmeister	KU	$ 2,310	-	$ 2,310
· Technology Development for Utilizing Solar Energy in Drying High-Moisture Grain; directors, D. S. Chung and R. Lipper	KSU	-	$ 20,000 / USDA	$ 20,000
· Solar Energy for Supplemental Heating of Ventilation Air for Swine Buildings; director, C. K. Spillman	KSU	-	$ 39,032 / USDA	$ 39,032
· Research on Solar Insolation on the Earth's Surface from Satellite Observations of Cloud Cover; director, E. T. Kanemasu	KSU	-	$ 70,000 (approx) NASA	$ 70,000
· Solar Radiation Measurement; director, D. Bark	KSU	$ 2,000 (approx)	-	$ 2,000
CATEGORY TOTALS		$16,414	$150,342	$166,756

RESEARCH CATEGORY: WIND

PROJECT	SCHOOL	STATE/UNIV. FUNDING	EXTERNAL FUNDING $ / SOURCE	TOTAL FUNDING FY 1977
· Wind Tunnel Testing of Air Foil Blade Sections for a Darrieus Type Wind Turbine; director, M. Snyder	WSU	-	$13,491 / Sandia Lab.	$13,491
· Wind Turbine Project; director, G. Thomann	WSU	$47,128	-	$47,128
· Farmland Industries Wind Research Fellowship; wind resource monitoring; director, G. L. Johnson	KSU	-	$ 3,639 / Farmland Industries	$ 3,639
· Inexpensive Wind Energy Meter; director, G. L. Johnson	KSU	$ 6,000	-	$ 6,000
CATEGORY TOTALS		$53,128	$17,130	$70,258